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Description of Piping for Domestic Use of Gas in the Bushwick High School, Brooklyn, N. Y.

[Prepared for the JOURNAL, by MR. HAROLD L. ALT.]

The latest strong argument, presented in a most forcible manner, showing that gas still holds its own, is well illustrated in the Bushwick High School, the magnificent building thereof being located on Irving avenue near Putnam avenue, Borough of Brooklyn, New York. This school building is piped for gas in quite thorough manner, especially as to the stairways, the domestic science room, the cooking class rooms, etc. The gas, conveyed into the building from the street, is run to four separate meters, shown on the basement plan, Fig. 1. One of these meters is used to control the supply of gas to the laboratory fittings, where it is used for laboratory and experimental purposes; the second meter measures the supply to all the ranges and stoves in the cooking room; the third meter registers the supply used for general lighting; the fourth meter is for kitchen service alone. From these four meters horizontal lines are extended (shown in Fig. 1), from which are taken risers of the various sizes given, with brass gate-valves located at the base of each rising line. None of the gas piping is run less than ¾-inch, and the short branches are of ½-inch and ¾-inch size, while all outlets are made of extra strong pipe.

The lines on each floor are equipped with a separate gate valve, governing that floor only, and are dripped. Supplemental valves of brass (gate type) are also installed, so as to control each section, including a special valve for the assembly room. The valves used for gas shut-offs are furnished with metal tags, appropriately marked. A printed directory, giving a schedule of these valves, their numbers and the lines they control, is framed and hung near the gas meters.

Ceiling outlets are all made ½-inch in diameter, and extend 2 inches below the ceiling or hub of the center pieces, where these are installed. The outlets for the brackets in the students' lavatories are located a distance of 7 feet above the floor, while in the teachers' closets they are placed 6 feet 6 inches. In the other rooms, and in general throughout the building, they are placed 7 feet 3 inches high, where the furniture or bulletin boards interfere.

The distributing pipes are run on the top of the floor or roof beams, bent pipes being used for drops, the connections of the branches to the main or circulating lines being made with malleable iron, right-and-left couplings. The piping used throughout is the best quality wrought iron, galvanized on outside only, with heavy, malleable iron, beaded, galvanized fittings. No bushings are used, proper reducing fittings being installed in every case. Y fittings, with 45° elbows, are used for branches wherever possible. The joints are made up with red lead after the pipe has been thoroughly reamed, and gasfitters' cement was not allowed. Where the gas piping interferes with heat ducts the lines are off-set around the latter, and in no case are run through the duct.

For the gas stoves and ranges in the domestic science room (fourth story) three separate 1¼-inch rising lines are run from the cellar, direct to the stoves and ranges, with gate valves at the ranges. A connection is made below the flooring of the fourth story with a tee-branch and 1-inch wrought iron pipe, which is extended to a point under the student's table. From this point the line is continued on with 1-inch risers, having composition sliding stem and lever gate valves connecting to 1-inch running lines under the projection of the table tops. The 1-inch running lines have 1-inch by ½-inch fittings and pipes, terminated with double outlets and female, brass, hose-cocks.

The outlets in the floor, under the laboratory tables and back of the stage, are extended along the underside of the table tops, terminating in either 2 or 4-way, brass, pillar-body cocks, or needle valves with hose ends and wooden handles. All the outlets of each table have brass gate valves located in the closet of the table. The gas piping and fittings of the work tables and physical laboratory demonstration tables are entirely of brass, where exposed above the floors, and have insulating joints placed between the brass and iron pipes, where they connect at the floor.

In the domestic science room, and in the lunch room kitchen as well, are placed 3 gas ranges, similar to George M. Clark & Co.'s No. A-381 "Jewel," with elevated gas oven on the side and reflectors for oven. These are supplied with gas through ¾-inch galvanized, wrought iron pipe and fittings, and are connected up with Russia iron vent fittings and dampers.

Over each range is placed a hood 6 feet long, 4 feet wide, by 2 feet 5 inches high, with flue over each range, the whole being constructed of heavy, japanned, wrought-steel, bound and braced all around the bottom with a 3-inch by ¼-inch bar, steel band, riveted and bolted to the hood.

The gas stoves used in the domestic science cooking tables for the pupils (shown in Fig. 2, which is a general plan of this room), are nickel plated, 2-hole, gas stoves, the branch supply pipe being

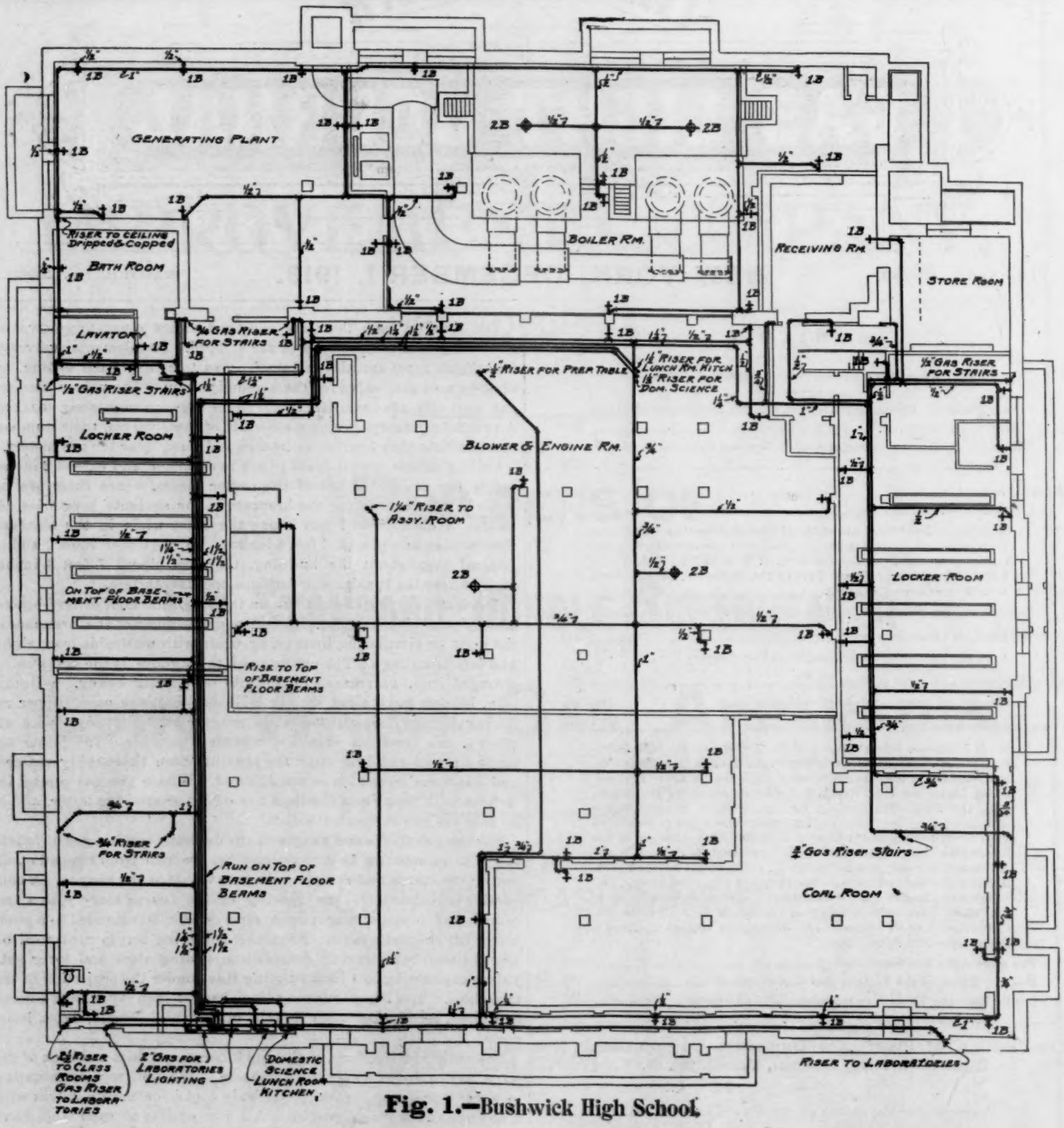

GENERATING PLANT
BOILER RM.
RECEIVING RM.
STORE ROOM
BATH ROOM
RISER TO CEILING Dripped & Capped
LAVATORY
¾" GAS RISER FOR STAIRS
½" GAS RISER STAIRS
LOCKER ROOM
BLOWER & ENGINE RM.
1" RISER FOR PREP TABLE
1½" RISER FOR LUNCH RM. KITCH
1½" RISER FOR DOM. SCIENCE
1½" GAS RISER FOR STAIRS
1¼" RISER TO ASSY. ROOM
ON TOP OF BASEMENT FLOOR BEAMS
RISE TO TOP OF BASEMENT FLOOR BEAMS
¾" RISER FOR STAIRS
RUN ON TOP OF BASEMENT FLOOR BEAMS
2" GAS RISER STAIRS
COAL ROOM
1½" RISER TO CLASS ROOMS GAS RISER TO LABORATORIES
2" GAS FOR LABORATORIES LIGHTING
DOMESTIC SCIENCE LUNCH ROOM KITCHEN
RISER TO LABORATORIES

Fig. 1.—Bushwick High School.

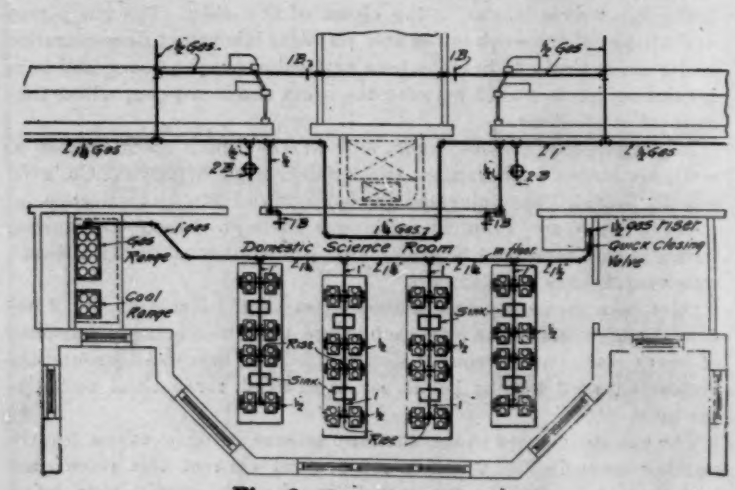


Fig. 2.—Bushwick High School.

equipped with a brass gate valve with brass stop cocks to hot plates and connected to the stove with a brass union. Quick closing valves are placed on all the main branches in the domestic science room.

Notes on the Carbonization of Coal in Vertical Retorts.

[Prepared for Eighth Meeting, American Gas Institute, by Mr. O. B. Evans.]

This paper describes some experiments recently made on vertical retorts of the intermittent type, and include observations of temperatures within the charge, pressures, analyses of the gases from the core of the charge, composition of gases distilled at low temperatures, resistance to flow of gases through coal in the various stages of distillation, a study of the progress of carbonization, as shown by sections cut through vertical pipes filled with coal and carbonized for various periods, and an argument based upon the experiments, giving the proportion of gas traveling through the core of the charge and through the coke.

The setting was of the United Gas Improvement Company design, located at Philadelphia, the installation consisting of 5 benches of 9's, the retorts 18 feet 6 inches long, 10 by 14 inches at the top and 15½ by 21½ inches at the bottom; holding when filled, to within 4 feet of the top, about 950 pounds of coal each. The coal was a West Virginia gas coal, analyzing as follows:

Composition.	Per Cent.
Moisture (air dried)	0.8
Volatile combustible	38.6
Fixed carbon	53.7
Ash	6.9
Total	100.0
Ultimate Analysis of Dry Sample.	
Carbon	77.9
Hydrogen	5.3
Oxygen	6.8
Nitrogen	1.7
Sulphur	1.4
Ash	6.9
Total	100.0

The first experiment was to determine the temperature of the core of the charge at various points throughout the period of carbonization. A 1¼-inch wrought iron pipe, closed at the bottom, was put in the retort, held by spiders, and the retort charged with screened coal, size from 1 to 2-inch cube. A thermocouple, 21 feet long, was lowered into the pipe, and the temperature read by a high resistance millivolt meter. The high resistance instrument was used to reduce the error introduced by the changing resistance of the fire ends, caused by the varying length of the heated portion. The ½-inch protecting pipe around the couple was cut off 3 inches from the hot junction, so as expose it directly to the heated surface of the 1¼-inch pipe, and insure more accurate readings. The couple was allowed to stay in each position 10 minutes to attain the correct temperature. Fig. 1 is a section of the retort showing the points at which temperatures were taken.

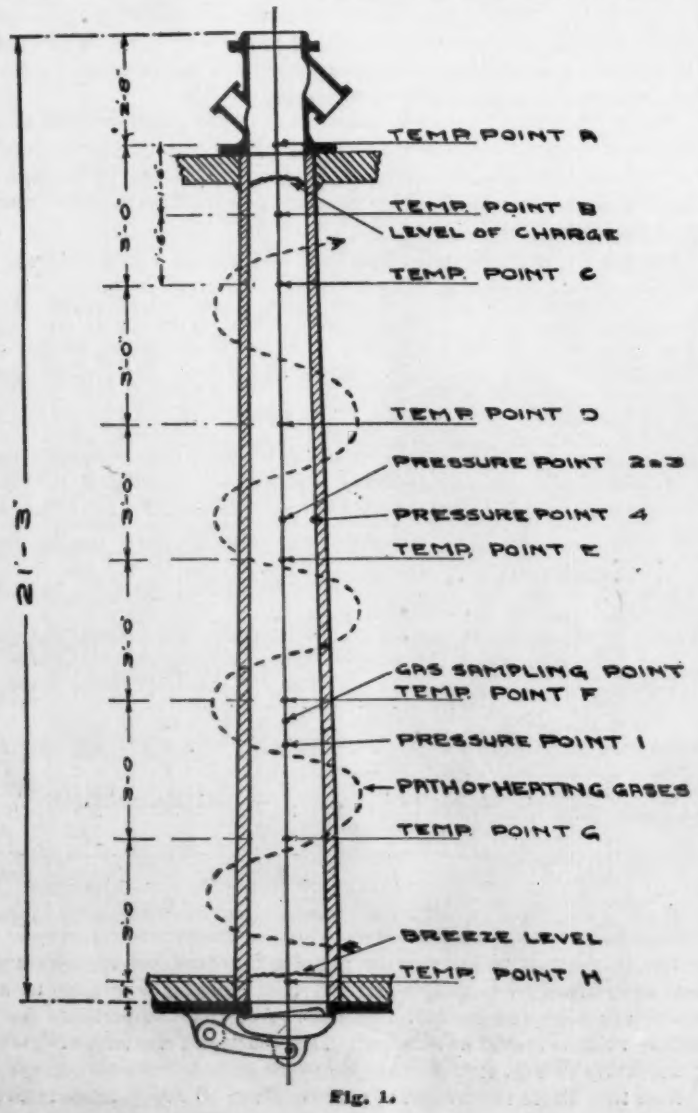
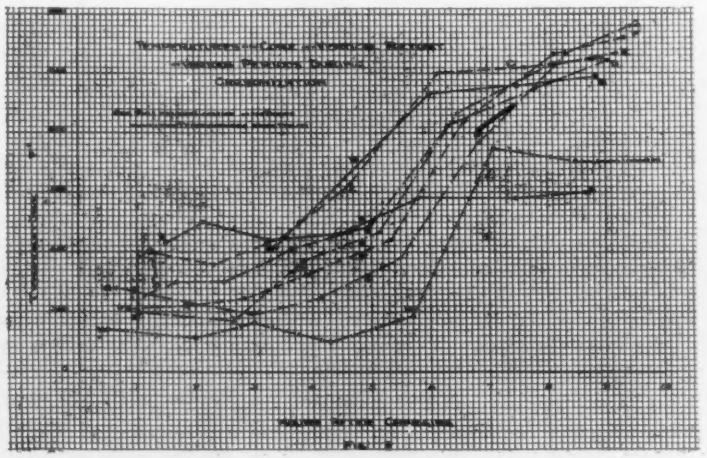


Fig. 1.

Fig. 2 shows the temperature recorded, and in Fig. 3 are plotted isothermals, or the time required for any point to reach a given temperature.



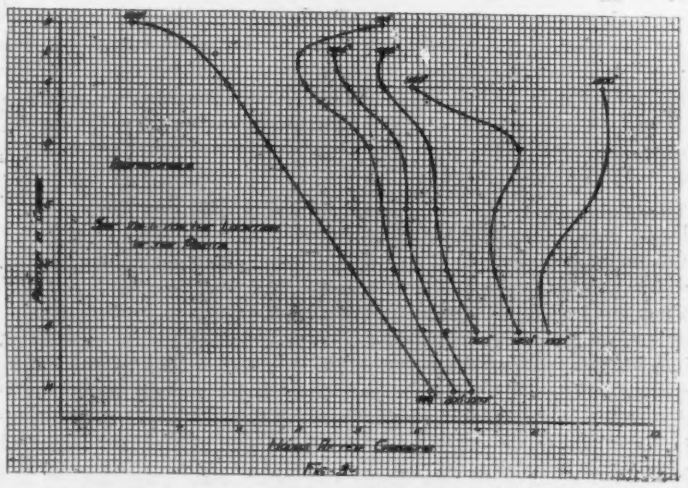
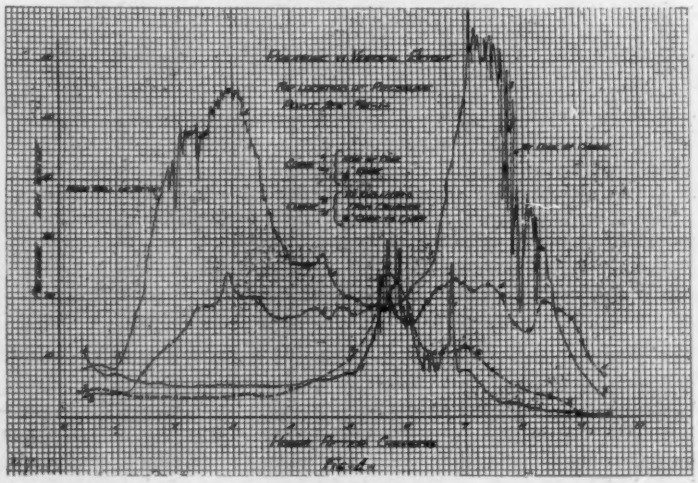


Fig. 2 shows the low temperature in the ore of the charge during the period of transition from coal to coke, and agrees with similar experiments made on coke ovens. When the carbonizing period is about half over (about 60 per cent. of the gas, by volume, has been given off, as in Fig. 4, and nearly all of the tar), the temperature



rises rapidly. To allow the escape of the gas through the core as freely as possible, it is desirable that the top of the core shall not carbonize until after the bottom. If the top becomes plastic ahead of the bottom, the gas generated in the bottom must break through this plastic mass, or else escape through the hot coke. The flow of gas through hot coke is considered injurious, as valuable constituents may be decomposed.

In Fig. 3 note that the top of the charge reaches the plastic stage (at about 709°) nearly 2 hours ahead of the bottom, indicating that with the heats used the sectional area of the retort should have been

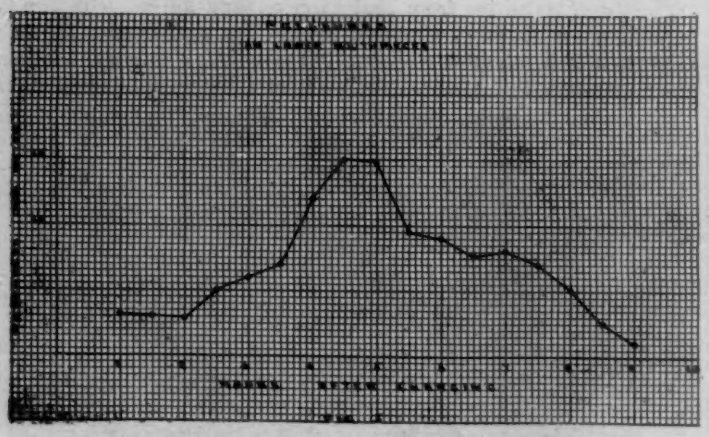
greater throughout. With the same taper the relative areas of the top and bottom approach more nearly as the areas increase, and since the temperature of the retort at the bottom is several hundred degrees above that at the top, it is evident that, were the area at the top increased sufficiently, the core at the top would become plastic later than that at the bottom

If with this particular retort the heats were reduced to burn off the charge in 12 hours, instead of 10, the difference in temperature between the top of the retort and the bottom would be greater with the 12-hour charge than with the 10; and, since the top section would be subjected to a lower temperature, its core would carbonize later.

Some taper is necessary to insure the dropping of the charge, and the design of a retort is dependent upon the system of heating, and the desired time of carbonization.

To determine the pressures in the charge ¼ inch pipes, open at the bottom, were put into the retorts while they were being charged. The results of these observations are given in Fig. 4. Curves 1 and 2 show the pressure in the core of the charge when using screened coal, ½ inch cube; curve 3 gives the pressure at the core, and curve 4 that near the wall of the retort when using run of crushed coal, size from 3 inch cube to dust. As expected, the pressure with coal of nearly uniform size is less than when the size varies considerably, from the fact that the per cent. of voids increases as the material approaches more nearly a uniform size. Comparing curves 1 and 2 of Fig. 4 with the temperature curve of Fig. 2, indicates that, when the coal reaches about 700°, it melts, and the gas generated does not escape until the pressure rises sufficiently for it to break its way through this sticky mass. These curves are directly comparable since, though from different retorts, they were in the same bench and charged at the same time. This view is strengthened by the fact that the pressure fluctuates considerably. Curves 3 and 4 of Fig. 4 confirm this theory, the coal near the wall of the retort becoming plastic about 5 hours before that at the core. The fact that the peak of curve 3 does not occur at the same time as the peak of 1 and 2 may be due to the difference in the size of coal used, and also to a less rapid rise in temperature. One remarkable point is that, while the ends of the pressure pipes are only 5 inches apart, horizontally, there is a difference in pressure between these two points of about 30 inches when the direction of flow is in towards the core and 40 inches when the direction of flow is towards the retort wall. This shows that the plastic layer of coal when strengthened by a coke backing is more resistant to gas flow than when backed by green coal.

Fig. 5 shows the pressure on the bottom lid. These readings were

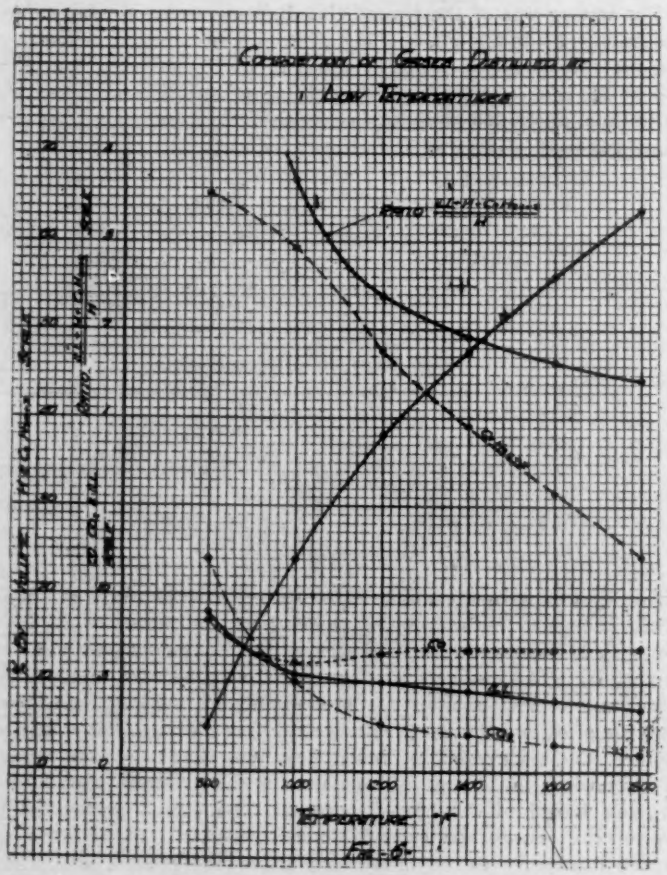


made some months previous to those of Fig. 4, so that the results are not strictly comparable, although in general they agree. The high pressure—5 hours after charging—occurs when the top of the charge becomes plastic (about 700°, see Figs. 2 and 3), and shows the increase in pressure on the lower lids, caused by the top section carbonizing before the bottom.

During late years numerous investigations have been made of carbonization at low temperatures. From experiments conducted by Porter and Ovitz, and tests made by the United Gas Improvement Company, table 2 has been constructed, and the composition of the gas is shown graphically in Fig. 6.

The ratio of the hydrogen to the sum of the hydrogen and the hydrocarbons decreases as the temperature of carbonization increases. This ratio would seem, therefore, to identify any gas and show at what temperature it had been distilled.

Note that the tar per ton increases with the temperature to a maxi-



mum and then decreases, while the tar per 1,000 is a maximum at low temperature and decreases as the temperature rises. The large yield of tar at low temperature is, not because the quantity of tar produced is great, but because the yield of gas is very low. The decrease in tar per ton at the higher temperatures is due to the breaking down of the tarry oils to gas and free carbon.

Table 3 and Fig. 7 give the composition of the gases evolved at the different temperatures, the analyses calculated from Table 2. It will be noticed that there is a more rapid increase in the percentage of hydrogen and decrease in the percentage of paraffines as the temperature increases.

TABLE 2.—*Distillation of Gas Coal at Varying Temperatures.*

Temperature of Carbonization. Degrees F.	800.	1,000.	1,200.	1,400.	1,600	1,800.
Yield cu. ft. per lb	0.4	1.4	2.4	3.4	4.4	5.4
Tar, gals. per 2,000 lbs	11.0	22.0	26.0	27.0	23.0	—
Tar, gals per 1,000	13.8	7.9	5.4	4.0	2.6	—
Gas Calculated Free from N. & O.						
Illuminants	9.0	5.5	5.0	4.5	4.0	3.5
CO	8.5	6 2	6.7	6 8	6.9	7.0
H	5.0	24.0	38.0	47.5	56.0	63.7
C_nH_{2n+2}	65.5	59.3	47.6	39.1	31.5	24.5
CO_2	12.0	5.0	2.7	2.1	1.6	1.3
	100.0	100.0	100.0	100.0	100.0	100.0
Ratio $\frac{ILL+H+C_nH_{2n+2}}{H}$	15.9	3.70	2.38	1.93	1.63	1.44

TABLE 3.—*Calculated Composition of Gases (Freed from Oxygen and Nitrogen) Given Off between Various Temperature Limits.*[1]

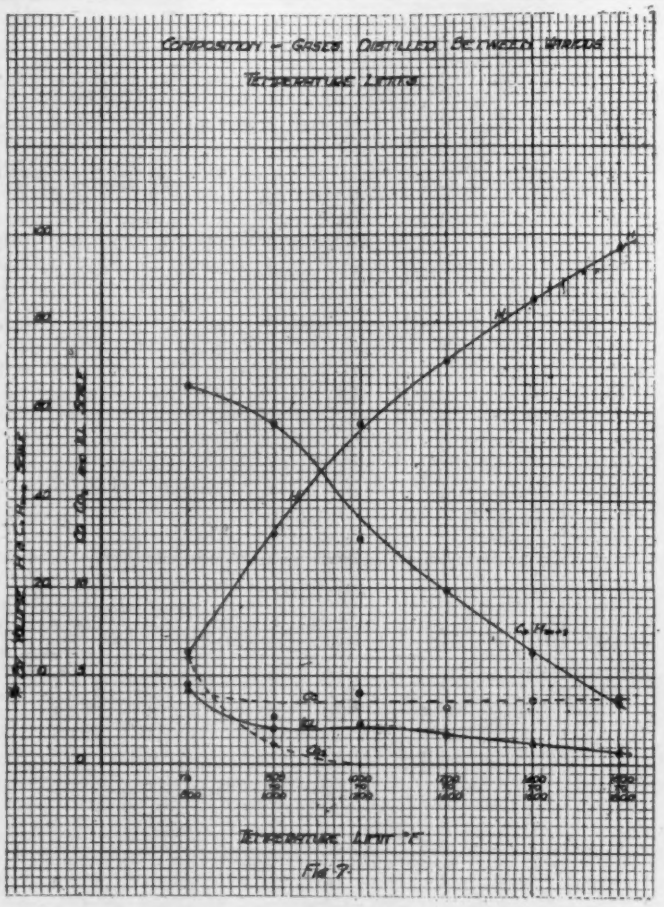
Temperature Limit.	Below 800.	800 to 1,000.	1,000 to 1,200.	1,200 to 1,400.	1,400 to 1,600.	1,600 to 1,800.
Cu. ft. of gas per lb.	0.4	1.0	1.0	1.0	1.0	1.0
Illuminants	9.0	4.0	4.3	3.3	2.3	1.3
CO	8.5	5.3	8.0	6.4	7.3	7.4
H	5.0	31.7	57.0	71.0	85.4	97.3
C_nH_{2n+2}	65.5	56.8	30.7	19.3	5.0	[2]6.0
CO_2	22.0	2.2	0.0	0.0	0.0	0.0
Totals	100.0	100.0	100.0	100.0	100.0	100.0

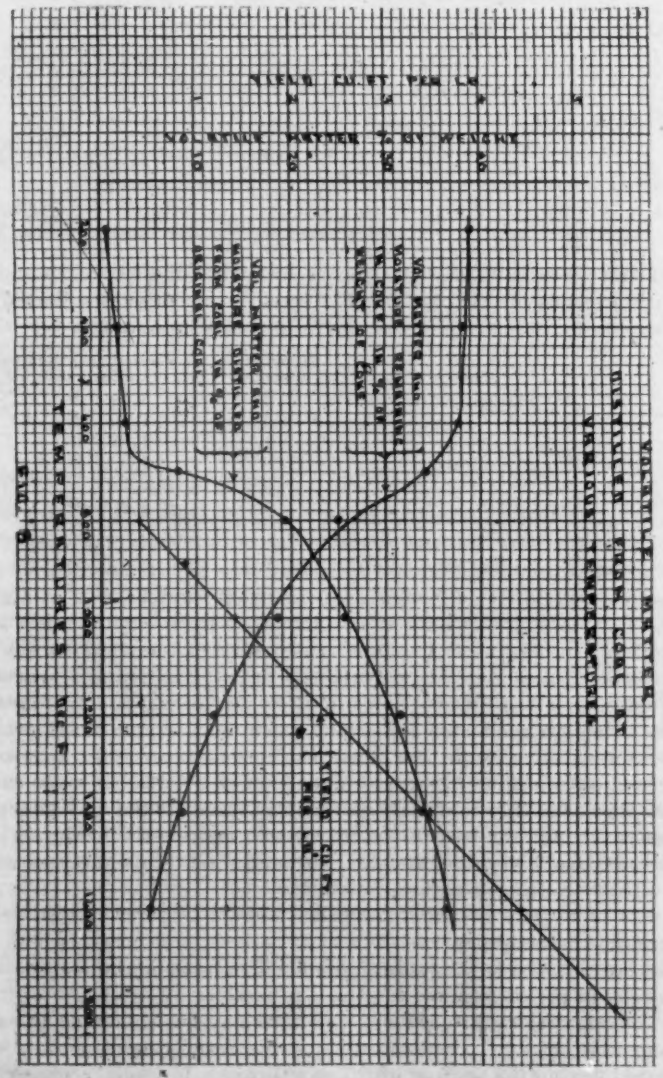
1. Temperature in degrees F.

2. This signifies that not only are no gases of the paraffine series generated, but that some of those distilled at lower temperatures have been decomposed.

The quantity of volatile matter given off at various temperatures was determined by heating a mass of coal (about 180 grams) in an electric furnace and maintaining it at the desired temperature until all the volatile matter has escaped. The results of these tests are given graphically in Fig. 8.

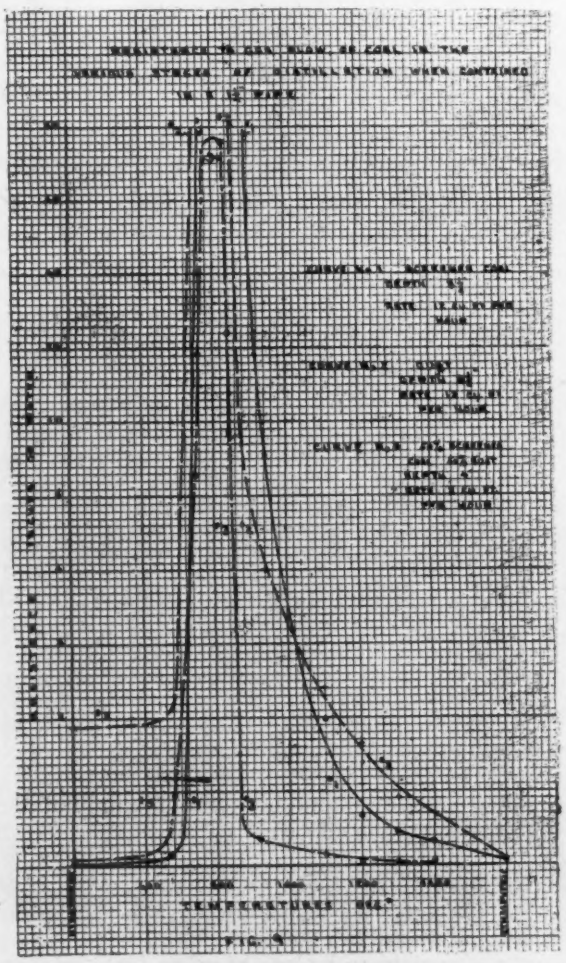
Note that while the weight of volatile given off at low temperatures





is comparatively great, the actual gas evolved is low—the explanation being that, at the low temperature, all of the moisture in the coal, as well as the water of combination, is vaporized, while the specific gravity of the gas is high. This, in part, accounts for the apparent large volume of gas yielded from the coal when first introduced into a retort.

To determine the resistance to gas flow through the charge, when carbonized at different temperatures, a 1¼-inch pipe was filled, to depths of 4 inches and 8½ inches, with coal of various sizes, and placed vertically in an electric furnace. Gas was passed through this coal (gas used instead of air to avoid oxidizing action) and the pressure required to force it through at a given rate was noted. The charge was then heated and kept at the various temperatures until all the gas which could be distilled at this temperature was driven off, when the resistance to flow was again measured. The results of these tests are shown in Table 4 and Fig. 9.



In this Figure the carbonization can be followed through the plastic stage, in which the resistance is very high, to the coking stage, in which the resistance gradually decreases. The effect of fine coal vs. screened coal is shown by the marked increase in resistance of the former before carbonization; after the coke has formed, the resistance is apparently independent of the size of the original coal. Under actual working conditions these results would probably be modified. Due to the clogging of the core by the condensable tarry vapors, the increase in resistance through fine coal over coarse coal is no doubt greater than shown by the small scale experiments. Also, since a given volume of retort will hold a greater weight of fine coal than of screened, the coke made from the screened coal probably contains more channels for the flo wof gas than does that made from fine coal, and will, therefore, have a lower resistance. The coke made in the experiment was very light and porous. In actual practice it is materially denser, probably due to the weight in which it is subjected while coking, and to the fact that the pores fill up with lampblack. We should expect, therefore, to find the actual resistances considerably higher than indicated.

The approximate rate of flow through the top section of a vertical retort, for the first 5 hours after charging, is 6 cubic feet of gas per square inch of area per hour; while in the tests upon coal 8½ inches deep, the rate was 10 cubic feet per square inch of area. Correcting the experimental figures to a basis of 6 cubic feet per square inch (on the assumption that the quantity of flow varies inversely as the length, and directly as the square root of the difference in pressure)

TABLE 4.—*Resistance to Flow of Gas Through a 1½-Inch Vertical Pipe Filled With Various Sizes of Coal and to Various Depths.*

Coal ¾-Inch Cube, 8½ Inches Deep, 12 Cubic Feet of Gas Per Hour.				Coal Dust 8½ Inches Deep, 12 Cubic Feet of Gas Per Hour.				Coal, 50 Per Cent. ¾Inch Lump, 50 Per Cent. Dust, 4 Inches Deep, 2 Cubic Feet of Gas Per Hour.			
Temperature.	Pres.	Cubic Feet Per Hour.	Pres. to Pass 12 Cubic Feet Per Hour.	Temperature.	Pres.	Cubic Feet Per Hour.	Pres. to Pass 12 Cubic Feet Per Hour.	Temperature.	Pres.	Cubic Foet Per Hour.	Pres. to Pass 2 Cubic Feet Per Hour.
Atmospheric	0.035	12.0	0.035	Atmospheric	1.64	11.2	1.88	Atmospheric	0.11	2.12	0.10
670° F.	0.144	12.5	0.133	670° F.	6.73	3.3	89.0	680° F.	0.39	1.28	0.95
760	2.7	0.0	..	760	7.4	0.0	..	750	4.8	1.74	6.34
850	2.7	0.0	..	850	7.7	3.3	102.0	760	7.6	1.26	19.20
940	2.5	6 82	7.70	940	2.96	10.3	4.02	830	11.8	0.79	76.00
1,100	2.04	12 16	1.99	1,100	2.0	10.9	2.42	840	11.4	1.38	24.00
1,200	0.74	12.5	0.68	1,200	1.44	11.2	1.65	920	0.33	1.89	0.37
1,300	0.39	10.9	0.47	1,300	0.97	12.3	0.92	1,100	0.2	2.35	0.14
1,400	0.31	11.7	0.32	1,400	0.75	12.4	0.70	1,200	0.09	2.67	0.05
....	..	..	..	....	..	..	..	1,300	0.08	2 46	0.05
....	..	..	..	....	..	..	..	1,400	0.07	1.77	0.09
After cooling to atmospheric temperature.	0.062	12.0	0.062	....	0.093	12.1	0.092	....	..	..	..

the resistance shown by curves 1 and 2 in Fig. 9 would be equivalent to that occurring in a length of 2 feet when passing gas at the same rate as a vertical retort.

Assuming that approximately half the gas flows through the plastic envelope surrounding the uncarbonized coal, the rate of flow would not be far from 10 cubic feet per hour per square foot of surface. Due to the weight to which this plastic mass is subjected, it is probably much less permeable by gas even than shown in Fig. 9. Some of the tarry oils distilled from the coke outside of the plastic mass probably condense while passing through it, tending to further increase its resistance, so that in practice, even with the extremely low rate of flow, the drop in pressure through it may be at times as much as 30 inches.

In considering the travel of the gas, whether through the cold core of green coal or through the partially coked mass, due regard must be paid to the character of the original coal. It is evident that the gas flow will be along the path of least resistance, and that with lump coal the resistance to flow through the core is considerably less than with fine coal. Therefore, it seems reasonable to suppose that, if the flow is divided, some escaping through the core and the remainder through the coke, the proportion of gas escaping through the core will be greater in a charge of lump coal than with fine coal. An examination of coke, after it has cooled, will not give an accurate clue as to its conditions while hot, the experiments showing a cracking of the coke during cooling, as indicated by the sudden drop in resistance.

In the above tests the coal began to melt at about 700° F., becoming plastic at 750° and again solidifying at 825°. The coke formed at 825° was powdered and heated to a temperature of 1,400°. No cementing of the powdered particles took place, showing that the phenomenon of coking took place at a temperature below 825° F., and that above this temperature the binding property was destroyed. To study further the generation of gas and the formation of coke in vertical retorts, a 1-inch pipe was placed in the core of a vertical retort, the end being 6 feet above the bottom of the charge and about 9 feet below the top of a normal charge, gas samples being drawn through the pipe and analyzed. To prevent overheating the gas during its passage through the pipe, and to insure an accurate sample of the gas actually in the core, this particular retort was filled with coal, eliminating the ordinary free space used for fixing the gas. The remaining 8 retorts were charged at the same time (leaving the usual space above the charge), and simultaneous samples taken from the hydraulic main and from the sampling pipe. The coal used was run of crusher, varying from 3 inch lumps to dust. The results are given in Table 5 and Fig. 10.

In the gas from the hydraulic main, it will be noticed that the percentage of hydrogen gradually increases with the time of carbonization, while the percentages of marsh gas (CH_4) and ethane (C_2H_6) decreased. The gas from the sampling pipe shows a rather peculiar variation, in that the hydrogen starts out fairly high, decreases, and again increases. The marsh gas shows a gradual decrease, while the ethane increases, and then rapidly decreases. Ethane is more easily decomposed by heat than is marsh gas, hence we conclude that the variatton in hydrogen is due, in some part, to the different quantities of ethane decomposed.

TABLE 5.

Hours After Charging.	Sample from Hydraulic Main. 1	4½	8	Sample from the Axis of the Charge 6 Feet Above the Bottom. 1	4½	8
Illuminants	6.0	4.4	2.1	5.8	5.5	1.0
CO	6.8	7.5	7.9	7.3	5.1	9.3
H_2	37.1	48.7	61.9	43.4	29.2	68.2
CH_4	33.6	33.2	24.1	28.8	26.2	16.9
C_2H_6	8.1	1.1	0.0	7.6	21.5	0.8
CO_2	3 8	1.5	1.3	3.8	8.5	1.0
O_2	0.7	0.4	0.8	0.7	0.9	0 7
N_2	3.9	3.2	1.9	2.6	3.1	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Calculated Freed from Nitrogen and Oxygen.						
Illuminants	6.3	4.5	2.2	6.0	5.7	1.0
CO	7 1	7.8	8.1	7.5	5.5	9.6
H_2	38.9	50.6	63.6	44.9	30.4	70.2
CH_4	35.2	34.5	24.8	29.8	27.3	17.4
C_2H_6	8.5	1.1	0.0	7.8	22.4	0.8
CO_2	4 0	1.5	1.3	4.0	8.9	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Ratio: $\frac{Ill + H + CH_4 + C_2H_6}{H}$	2.28	1.79	1.42	1.97	2.82	1.27

From the ratio of the hydrogen to the sum of the hydrogen and the hydrocarbons, in Fig. 6, Table 5, it would seem th e gas collected corresponds to that carbonized at the following tempe ratures:

Sample from	Hour After Charging.	Co rresponding Temperature of Carbonization.
Hydraulic main	1	1,240° F.
"	4½	1,460° F.
"	8	1,800° F.
Core of charge	1	1,380° F.
"	4½	1,100° F.
"	8	1,900° F.

Indicating that the first gas flowing up through the core of the charge has been distilled at a comparatively high temperature. Subsequent gas flowing through the core is generated, first, at a gradually decreasing and later at an increasing temperature. The average gas issuing from the top of the retort (determined by samples from the hydraulic main) corresponds to that distilled at a gradually increasing temperature. This might be due to its passage through the fixing surface at the top of the retort (and commercial practice has shown the effect of this superheating—an excess resulting in the formation of lamp black, and a deficiency producing poor candle power); or it may be due to the fact that some of the gas generated passes through the core of the charge and the remainder through the heated coke layer, the average temperature of this mixture rising with the progress of carbonization.

Gas at the rate of about 25 cubic feet per hour was also drawn through the sampling pipe for 2-hour periods, and condensed to 35°. The tar obtained is shown in Table 6. The quantity condensed near the end of the charge was too small to analyze.

The quantity of tar produced per 1,000 may be higher at the start than that shown. Condensation of the tarry vapors probably occurred during the passage of the gas through the cooler upper portions of the core, this tar re-evaporating later and increasing the ap-

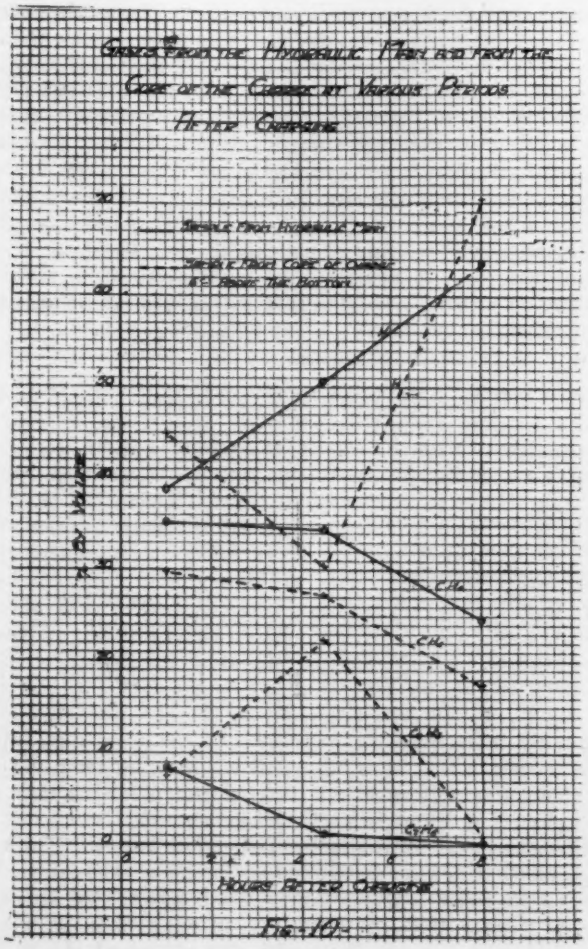


TABLE 6.—*Tar from Sample of Gas Collected from the Core of the Charge 6 Feet above the Bottom and Cooled to 35° F.*

Hours After Charging.	0 to 2.	3½ to 5½.	7 to 9.
Corrected gas, cubic feet	58.0	48.0	50.0
Tar, gallons	0.066	0.525	0.004
Tar, gallons, per thousand	1.1	10.9	0.08
Specific gravity of tar	0.9901	0.9880	....
Unsulphonated matter, per cent. by volume	0.0	0.0	0.0
Distillation, Per Cent. by Volume.			
Up to 300° F.	2.0	1.9	....
300–400	25.9	8.9	....
400–500	30.7	28.1	....
500–600	17.8	32.1	....
600–700	10.9	21.4	....
700–750	4.6	5.7	....
	91.9	98.0	....
Coke, per cent., by weight	9.53	1.24	....

parent quantity obtained in the second sample. However, it is evident that the tar yield indicates the generation of a higher temperature gas the first 2 hours than between the 3½ and 5½-hour period (compare Table 2), thus agreeing with the deductions made from the analyses of the gases in Table 5.

To show the progress of carbonization, 8 inch pipes, 12 feet long, were filled with coal and lowered into vertical retorts which had been partially filled with coke after the previous charges had been dropped. The pipes were allowed to remain in the retorts for various lengths of time, and then withdrawn and cut through close to the bottom. Photographs of these sections are shown in Plates 1, 2 and 3.

One, 2 and 3 were subjected to carbonizing periods of respectively 1, 2½ and 5 hours, and show clearly the travel of the thin plastic layer inward towards the center. Analyses of the coke for volatile matter from different parts of the various charges are given in Table 7, and shown graphically in Fig. 11.

The curves in Fig. 11 are based upon the assumption that the volatile remaining in the coke corresponds to a definite carbonizing temperature, as shown in Fig. 8. This is true, of course, only when the coke has remained at this temperature sufficiently long to drive off all the volatile distillable at that temperature. For this reason the temperatures in Fig. 11 are probably lower than those actually reached. The very rapid falling off in temperature during the first stages of carbonization is clearly indicated.

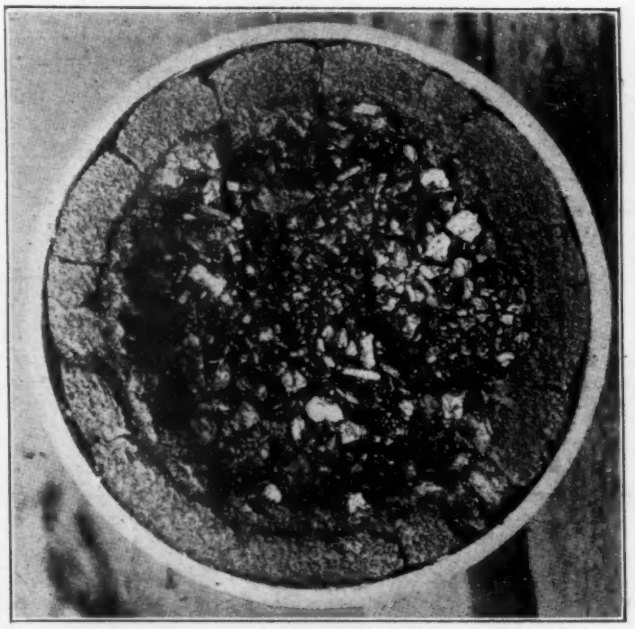


Plate 1.—Time of Carbonization 1 Hour.

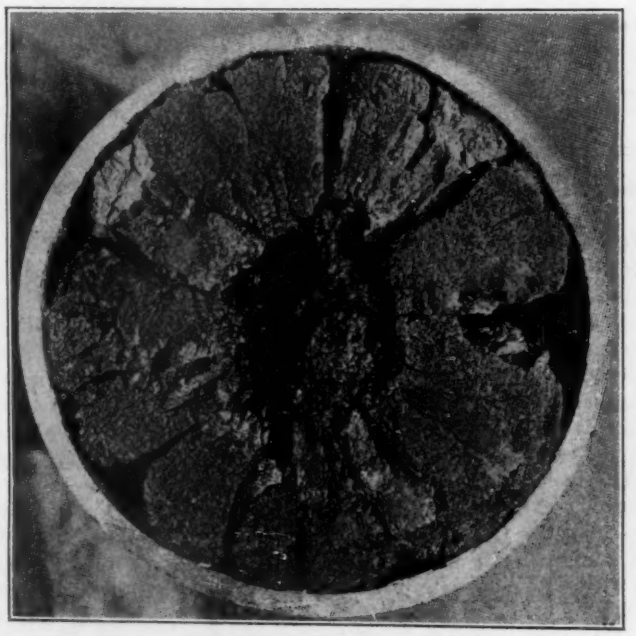


Plate 2.—Time of Carbonization 2½ Hours.

The volume of gas distilled above 700° increases approximately directly with the temperature. The volume of gas producing material increases with the time of carbonization until all the gas has been driven off from the coke lying next to the walls. Thereafter the volume remains nearly constant until the core reaches the plastic stage, and then decreases. If the flow of heat into the charge were uniform from hour-to-hour the quantity of gas produced would be small at the beginning, would increase to a maximum, and there remain until the core began to give off gas freely, when it would decrease. These general characteristics are shown in Fig. 12, though modified by the shape of the retort, and by the fact that the flow of heat through the fire brick retort is greatest at the start and gradually decreases.

TABLE 7.

Plate No.	1	2					3		
Time of Carbonization.	1 Hour.	2½ Hours.					5 Hours.		
Distance of center of layer from wall of pipe in inches.	1/16	1/8	1/4	3/8	1/2	2	3½	3/4	2	3½
Width of layer	1/8	1/4	1/4	1/4	1/4	1	1½	1/4	4	1/4
Per cent. of volatile in this layer	10.8	15.5	34.5	7.2	12.0	17.0	26.6	3.6	5.5	6.3
Probable temperature of layer	1,240	1,060	700	1,440	1,200	1,000	800	1,740	1,560	1,500

(*Continued on page* 346.)

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NEW YORK, MONDAY, DECEMBER 1, 1913.

BRIEFLY TOLD.

No Limit to Power and Authority of Commission.—The Public Service Commission, State of Missouri, in the matter of complaints against the Nevada Water, Light and Traction Company, has demanded the removal of the Company's General Manager. The attorneys for the Company declare that the decision is in direct conflict with the rulings of the Supreme Court of the State, and the case will be appealed. The Commission declares that the service is complained of, the number of consumers is decreasing, reasonable regulations are ignored, and that it is within its powers to determine measures for its betterment, and to order the defendant corporation to remove its Manager and secure the services of a competent person. It would seem that the Commission has been led into an untenable position. While undoubtedly within its province to point out faults in service, and within its powers to insist on their correction, it is presumably for the companies furnishing the service to say how best to bring about the changes ordered. While it may appear to the Commission that the officer complained of in the present case is responsible for the complaints, they may be due to causes beyond his control or even to orders of his superiors that he is forced to carry into execution, and his removal under the circumstances would not necessarily accomplish the results desired.

Geneva Meeting, Empire State Gas and Electric Association.—We presume that the officials of the Empire State Gas and Electric Association will resent even this slight notice of the meeting in Geneva, N. Y., of the named body, the 20th ult., but as the information was vouchsafed us by one who attended the session, we will risk the consequences. The meeting was held in Coliseum Hall, the proceedings were ably directed by the President (Mr. J. B. Long, of Syracuse), and the technical proceedings were of an exceedingly valuable nature. About 75 were recorded present.

Secretary Clark Insists.—Mr. Horace H. Clark, from his office as Secretary (115 N. Oak Park avenue, Oak Park, Ills.) of the Illinois Gas Association, under date of the 22d ult., mailed to each member a well-worded circular, that is bound to be productive of growth in all respects for that already virile body. Asserting that the executives are anxious to increase the names on the membership lists, he notes that he also mails an application for such membership, which should be placed where it will do the most good along the lines suggested. It is intimated that each new applicant will receive copies of the 1913 Directory of the body; also, a bound Volume of the "Proceedings" for the current year. He calls specific attention to the value of the Bureau of Information, which Bureau will, on request, answer individual questions regarding the industry which the questioners would like to have solved. He also requests that members who are not affiliated directly with the American Gas Institute but who wish to regularly receive copies of the "Gas Institute News," at half price, to write to him at once respecting this, so that the matter may be taken up forthwith with Secretary Ramsdell. Secretary Clark assures the members that the details for the 1914 meeting are in such forward shape that the success of the sessions is even now assured. In respect to the applications these should be in his hands, on or before the 20th inst., as an election on membership account is set for that date.

Joint Meeting, New York Sections, I. E. S. and N. E. L. A.—The Illuminating Engineering Society, New York Section, held a joint meeting with the New York Companies' Section, Nation Electric Light Association, at the Edison Auditorium, 44 West 27th street, New York, Monday, November 17, 1913. Messrs. H. M. Edwards and William Cullen Morris presided. After a short business meeting by each of the associations, Mr. H. M. Edwards introduced the first speaker, Mr. S. G. Rhodes, who read a very interesting and comprehensive paper on the methods and types of meters used abroad for measuring electrical energy, and also on street lighting abroad, both gas and electric. He also gave a very comprehensive description of the installations of the high intensity lamps used. Following this paper, Mr. H. W. Jackson, Engineer, the General Electric Company, gave a very interesting demonstration of the new, high-intensity, nitrogen-mazda lamps, showing specimens ranging from 100 to 1,000 watts. This was followed by a demonstration o the new Edison moving picture machine for residence entertaining, using one of the new nitrogen-mazda incandescent projection lamps. The meeting was concluded with a demonstration of the Neon tube lamps, by Mr. Alexander Maxwell. These lamps were loaned by Mr. Georges Claude, of France, for a demonstration in connection with a paper on these lamps read at the Pittsburgh Convention of the Illuminating Engineering Society. Among those present were Mr. C. F. La Combe, Chief Engineer, Department of Water and Light, New York city; Dr. A. S. McAllister, Dr. C. H. Sharpe, and Messrs. Preston S. Millar, S. H. Stickney, C. A. Littlefield, Basset Jones, Norman Macbeth and Clarence Law. The next meeting of the Society will be held December 18, 1913, at the Engineering Societies Building, The papers of the evening will be: "Architectual Features: Periods of Architectual Design," by Mr. F. T. Wallace, and on "Fixture Design," by Mr. Howard Walker.

To Know Something of Every Part of the Business.—The Progress Club, Brooklyn Union Gas Company, gave its second educational lecture in the Y. M. C. A. building, the evening of Tuesday last. The addresses were by Mr. Charles Boone, Engineer of the Metropolitan branch works, who spoke on "The Manufacture of Water Gas," and Mr. E. C. Uhlig, Chief Chemist, who described "The Work of the Chemist." Five hundred interested employees of the Company listened attentively to Mr. Boone as he took them through the making of gas, showing views of each part of the works and every apparatus used, from the receiving of the coal and oil in barges, to the storing of the purified gas in the holders. Mr. Uhlig had the stage filled with apparatus and showed just how he made these tests: How he measured candle power, how to determine calorific value, and how to separate and measure the constituent gases. An interesting musical programme was rendered during the intermission, and those in attendance showed their appreciation of this opportunity of learning something more about the product and service that give them employment. These lectures draw from every department of the business, and the executives, as well as salesmen, fitters, accountants and stokers, rub elbows and make comments. This Progress Clnb is doing wonderfully good work.

A Good Work Well Done.—Mr. S. B. Ormsby, Sec. Educational Association, the Consumers' Co., Toronto, is out with a "special notice" affording reasons why every one of its hundreds of employees should avail themselves of the splendid enducational opportunities offered for the class of 1913-14. To begin with, Secretary Ormsby remarks that, in the series of meetings ended June 17th last, 132 employees, from all divisions of the force, participated. The sessions

numbered 20, and the attendance thereat averaged 40. The diplomas earned and awarded numbered 37, which was, the Secretary remarks, "The largest number of diplomas issued by any one gas company in America." As a result of this study several advanced vacancies were filled by the naming thereto of men who had earned high percentage marks on examination papers, or who had shown interest in this forward movement of the Company. The graceful admission is made by the students that over 75 per cent. of those enrolled in the 1912-13 Course received great benefits from its curriculum. The Secretary then declared that the work prepared for 1913-14 will be on much broader and practical lines than heretofore, this greater scope being the sequel to the experience gained in practising the tentative plans. The usual terms of $2.50 to cover cost of enrollment, entitle each employee to the receipt of 10 instruction papers, along with the benefits accruing from attendance at the Class sessions. It is promised that from 2 to 5 speakers will take part in each of the 10 meetings of the Class and Course, which are to be bi-monthly during the season. And it is further declared that a stereopticon lantern, owned by the Company, will be used to illustrate and emphasize the text of lectures. In conclusion Secretary Ormsby puts forth the following, which, while it may not be altogether relished by the correspondence school manipulators as a class, is nevertheless right to the point: "Hundreds of correspondence courses charge from $20 to $35 for educational courses, which are not any better than those now offered our employees for $2.50. Of course, this sum pays only a small part of the full cost, the balance of which is paid by the Company, in order to encourage employees to advance." This is the sort of work that pays the master through improving the man, and President Hewit and his well-thinking, positive-acting associates are to be congratulated over the success which attended and is attending their splendidly applied efforts to, with one strike, improve the condition of their men and better the standing of the Consumers' Corporation.

CURRENT MENTION.—

THE last regular session of the New England Section, National Commercial Gas Association, was held in Wesleyan Hall, 36 Bromfield street, the evening of Friday, the 28th ult. The literary feature of the session was an excellent lecture on "Some Practical Installations of Gas Lighting," which was bountifully punctuated by a splendid series of stereopticon views, representative of gas illuminated stores, shops and factories. The subject was in the best vein of Mr. Robert F. Pierce, Illuminating Engineer, the Welsbach Lighting Company. That excellent feature of such gatherings, the Question Box, has been re-instituted, and Mr. C. J. Connell, the energetic and forceful Secretary of the Section, asks that those having queries for the Box should forward the same to him without delay.

THE advertising division of that modern industrial hive, the H. Mueller Manufacturing Company, of Decatur, Ills., has been successfully trying out another line of advertising method that is sure to add to the crowds that will gather about its exhibit in Philadelphia this week, during the momenous annual meeting of the National Commercial Gas Association. For some months the Mueller folks have been sending to the gas men blotter pads that, for our part at least, have been found useful, and are always before us in an ink-absorbing capacity. Of course they carry the Mueller "ads.," and all of this leads up to the Mueller calendar-blotter pads for December. It carries in left-haud, upper corner, a seal in black-and-red of the National Commercial Gas Association, with the admonition, "Don't fail to call on us in Booth 43," and also with the declaration that "You will be most welcome!" Good work, this.

COUNCILMAN FLETCHER, of St. Lonis, Mo., is responsible for a tentative ordinance, under the terms of which the city lighting inspector will be directed to make daily testings for candle power, instead of the weekly trials of the current practice. Meanwhile it seems relevant to remark that, when spoken to respecting the proposed change in the regulation, Inspector Jacobs declared that the tests made by his staff in the past twelvemonth failed to disclose a single instance in which the gas was below the statutory requirement—18 candles. In fact, the average over all was close to 20 candles.

THE Philadelphia *Inquirer*, last Monday, had this to say respecting the external lighting of the Academy of Music and its approaches during the continuance of the meeting of the National Commercial Gas Association: "Work was started on Saturday to transform the two blocks of Broad street, between Walnut and Spruce streets, into a great White Way. This will be completed by next Saturday night (Nov. 29th), when lights, totalling 36,000-candle power, will be turned on as part of the display in connection with the National Commercial Gas Association's annual meeting, which is to be held in the Academy of Music. Special gas pipe lines being laid along the curb, these to be connected with a small compressing plant, which will be installed among the other exhibition appliances in Horticultural Hall. All of the gas for the operation of these lamps will pass through this plant, and will be raised to 2 pounds pressure. The lamps will be mounted on ornamental posts, and will afford an example of the most up-to-date street lighting and similar to that now being used in some European cities, which are famous for brilliantly lighted streets. In addition to this lighting, there will be a number of outdoor gas arc lamps installed around convention and exhibition halls. This will increase the total of candle power on Broad street to 50,000 or more, insuring the greatest display of street lighting Philadelphia has ever seen. All ihis lighting will be displayed Monday night, December 1st, and will be kept in action each night until 11 o'clock, to December 6th."

THE engineers' files of reference books would be none the less complete were there added thereto a set of the booklets issued by the Joseph Dixon Crucible Company, of Jersey City, N. J. Some of these bear the titles, "Steam Traps," "Unions for Steam Pipes," "Feeding Graphite for Lubricating Purposes," and the like. The Dixon folks further announce that these will be sent free to any engineer who will forward a request for same. The articles were specially prepared by that well-known engineer-author, Mr. W. H. Wakeman, whose contributions to the technical process have been many and useful. The text is well supplemented by numerous well drawn illustrations.

THE Bucks County (Pa.) Public Service Company is making extensive improvements on its Langhorne plant. The main features of the betterments are: A new water gas set, additional purifiers and an increased oil storage. The contracts on such account were awarded to the Western Gas Construction Company.

NOTING the above recalls to mind the fact that Messrs. Kuemmerle & Co., of Philadelphia, (the operators of the Langhorne plant) have also placed a contract with the Western Gas Construction Company for the installation of a complete water gas plant on the high-pressure gas system, by means of which the Kennebec Gas and Fuel Company propose to supply gas to the residents of Waterville, Me. This plant will be in operation about June first, 1914.

ON the 20th inst. the New Jersey State Board of Public Utilities suggested to the authorities of Jersey City that a further inquiry into the matter of gas rate charges would not likely be advantageous to gas users. The Public Service Gas Company, at the instance of the Commissioners, recently put into effect a uniform State-wide charge of 90 cents, but this done, the authorities of Jersey City were prompting the thought that, because Jersey City was a center of large population, the rate there should be lower. Meanwhile, the Commissioners seem to have determined that the true policy is to have uniformity of schedules in so far as possible.

MR. ERANK W. FRUEAUFF, for several years Vice-President the Denver (Col.) Gas and Electric Light Company, and its predecessor, the Denver Gas and Electric Company, has been elected President, vice Mr. Henry L. Doherty, who assumes the newly created office of Chairman of the Board. Mr. William J. Barker, for 30 years connected with the illuminating industry of Denver, has been elected Vice-President and General Manager. The newly designated offices of Assistant Treasurer and Assistant Secretary were filled by the respective naming of Mr. W. P. Troth and Mr. E. E. McWhiney.

"REGULATION OF PUBLIC UTILITIES" is the title of a chapter in the proceedings arranged for discussion, at the meeting in this city (11th and 12th insts.) of the Civic Federation, a body the good offices of which have already been well exemplified. The Federation in this respect announces that its Department on Regulation of Industrial Corporations is considering the question as to whether monopoly should be regulated or exterminated, the Department on Regulation of inter-State and Municipal Utilities being working in a new field where there is practically no disagreement with the contention that monopoly is a good thing; that is, such natural monopolies as street railways, gas and electric light companies. While competition in some form is desirable in all other fields, publicists and special students of the question to-day decry the establishment of competing street railway lines, gas companies or electric light companies, but with this declaration they are also as insistent that there should be adequate regulation by a public authority to protect the people from inferior service and extortionate prices. The Department will report its proposed bill for regulation by the State or street railroads, gas and electric light companies and other municipal utilities, upon which it has been at work for over 18 months.

(*Continued from page* 343.)

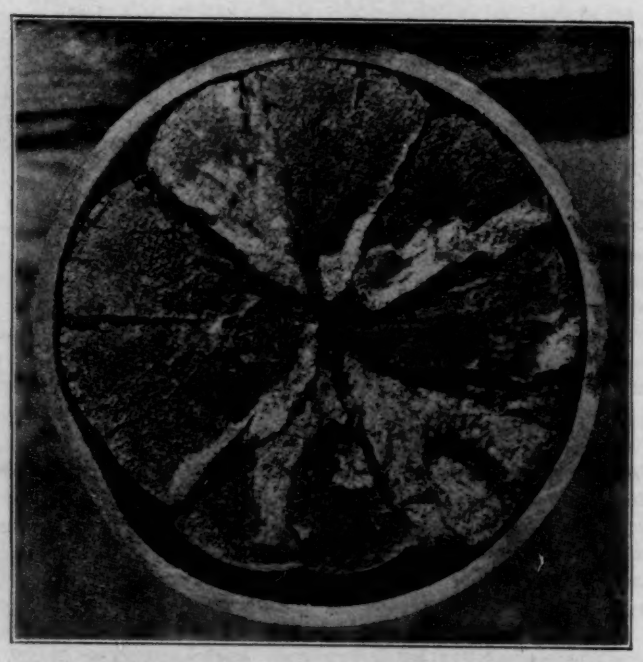


Plate 3.—Time of Carbonization 5 Hours.

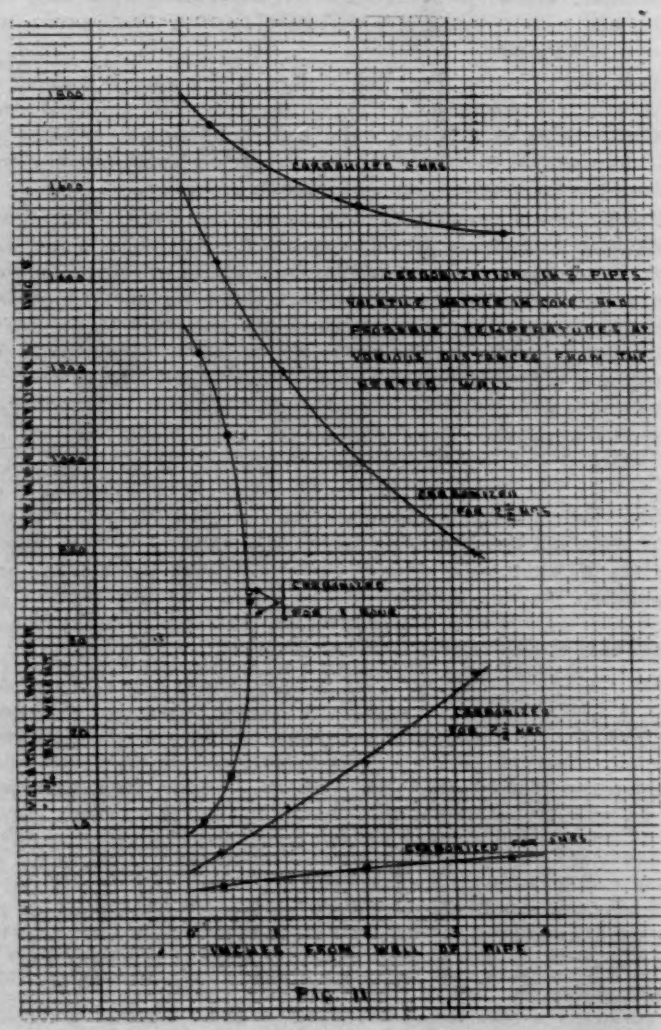


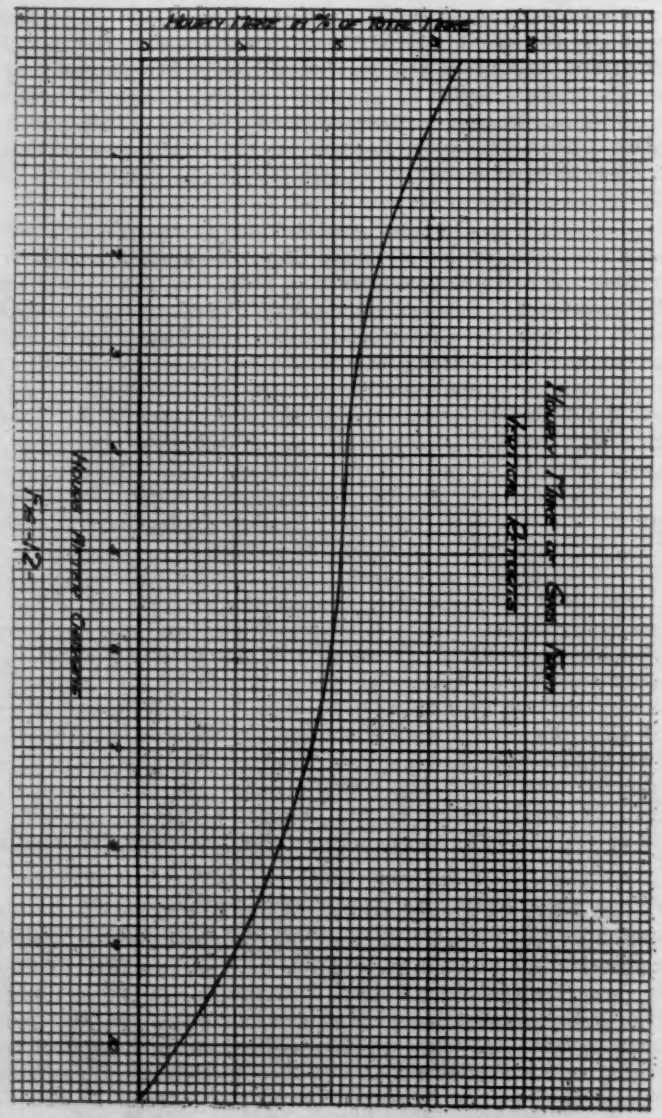
FIG. 11

We may summarize these experiments as indicating the following:

Gas coal becomes plastic with the free evolution of gas at about 700° and solidifies at 825°.

The plastic envelope around the uncoked coal is very sharply defined, and about ¼-inch thick. When of considerable thickness it is almost impervious to gas at high rates of flow, and when thin, and at the low rate of flow occurring in practice, the drop in pressure through the plastic envelope probably does not average over 30 inches.

The resistance of partially coked coal, say carbonized at 1,000°, is about 7 times that of coal carbonized at 1,400°, about twice that of coal dust and 85 times that of screened lump coal, when passing 10 cubic feet of gas per square inch of area per hour.



If coal is heated to 825° coke is formed, and if this coke is broken up and heated to 1,400°, no cementing of the broken pieces occurs. The center of the charge near the top attains a temperature of 600° about 3 hours after charging, and 800° an hour later. The center of the charge near the bottom reaches 600° in 5½ hours, and 800° ½ an hour later. The entire core reaches 1,400° at about the same time (7½ hours); consequently, since the bottom of the retort itself is several hundred degrees hotter than the top, the average temperature of a horizontal zone near the top of the retort must, after 7½ hours, be greater than that of a similar zone at the bottom. The maximum pressure in the core of the retort occurs somewhere about when the temperature reaches between 800° and 1,000°. The actual pressure depends upon the free space in the coal, screened coal of uniform size giving the maximum space and producing the minimum pressure. The difference in pressure within a horizontal distance of 5 inches may be as much as 40 inches of water. The gas collected from the core of a charge near the bottom, 1 hour after charging, is a product of higher temperature than that collected 4½ hours after charging. Gas collected from the same point after the core has passed the plastic stage is a higher temperature product than either.

The average gas leaving the retort is a product of gradually increasing temperatures. These temperatures in general are higher than those at which the gas flowing through the core has been produced. After the core has passed the plastic stage, the gas collected in the core of the charge at the bottom may be a higher temperature product than that collected in the core near the top of the charge, so the average gas leaving the retort may be a product of lower average temperature than that in bottom of core.

From the data given above, the following deductions seem warranted:

The maximum temperature of the plastic envelope is about 825°; hence the average gas guaranteed by this envelope must be at some lower temperature. The gas collected near the bottom of the core of

the charge, for the first ½ of the carbonizing period, is a higher temperature product than that generated by the plastic envelope. The gas collected in the core, the first hour after charging, has been distilled at a higher temperature than that collected 4½ hours after charging. Since the gas collected in the core has been generated above 825°, and since in its flow through the core it is not subjected to a greater temperature than 800° for the first 4 hours, it follows that this gas was distilled from the material lying outside of the plastic envelope, as well as from the envelope itself, and must, therefore, have passed through the envelope.

The gas produced in the lower portion of the charge, outside of the plastic envelope, say at *A*, Fig. 13, has two paths of travel—one horizontally through the partially formed coke and the plastic layer, then vertically through the green core (*A*, *B*, *C*, *D*); and the other vertically through the partially formed coke near the walls (*A*, *E*) This being true, *A* must be the point of highest pressure, and all the gas distilled between *A* and *F* escapes by the path, *A*, *E*; that distilled between *A* and *C* leaving by the path *A*, *B*, *C*, *D*. We have shown that the temperature of distillation of the gas flowing from *A* by the path *A*, *B*, *C*, *D*, decreases with the time after charging. Therefore, the temperature of *A* must decrease. The quantity of gas given off from any mass of coal, while the zone *C*, *A*, is passing it, will be a smaller proportion of the ultimate total gas distilled from the coal when the temperature of *A* is low than when it is high. Therefore, the lower the temperature of *A*, the smaller the proportion of gas flowing along the path, *A*, *B*, *C*, *D*.

Vertical Half Section Through a Portion of the Charge Showing the Path of Travel of the Gases and the Temperature Gradient.

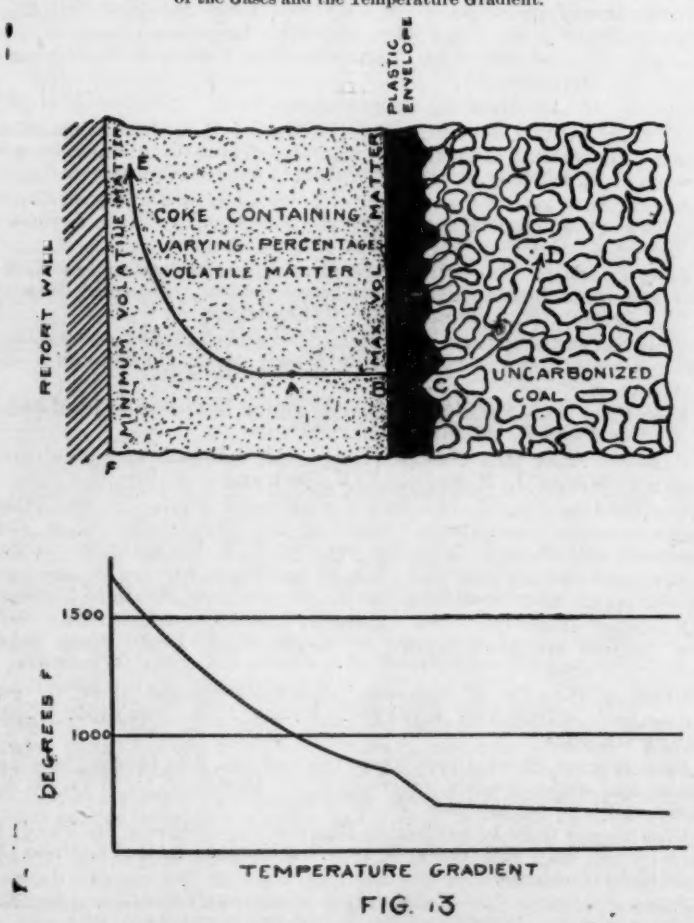


FIG. 13

Since the temperature of *B* (the high temperature side of the plastic envelope) remains constant at about 825°, and since the flow of heat is in from the retort wall *F*, it follows that, as the temperature of *A* decreases, *A* must move towards the plastic envelope, or the distance *A*, *B* must decrease. We may arrive at this conclusion by another process of reasoning.

The drop in pressure along the path *A*, *B*, *C*, *D*, must be at all times equal to that along the path *A*, *E*. The drop along path *A*, *E*, must be a maximum at the beginning of the charge, not only because the area between *A* and the retort wall, *F*, is smallest at that time, but also because the partially formed coke offers a greater resistance than does the more completely formed coke producer later. It follows, therefore, that the drop in pressure along the path *A*, *B*, *C*, *D* (being at all times equal to that along *A*, *E*) must be greatest at the beginning of the charge. The pressure at *A* is also greatest at this time.

The resistance of path *A*, *B*, *C*, *D* is made up of the resistance *A*, *B*, of the partially formed coke between the high pressure point *A*, and the plastic layer, of *B*, *C*, through the plastic envelope and of *C*, *D*, through the green core.

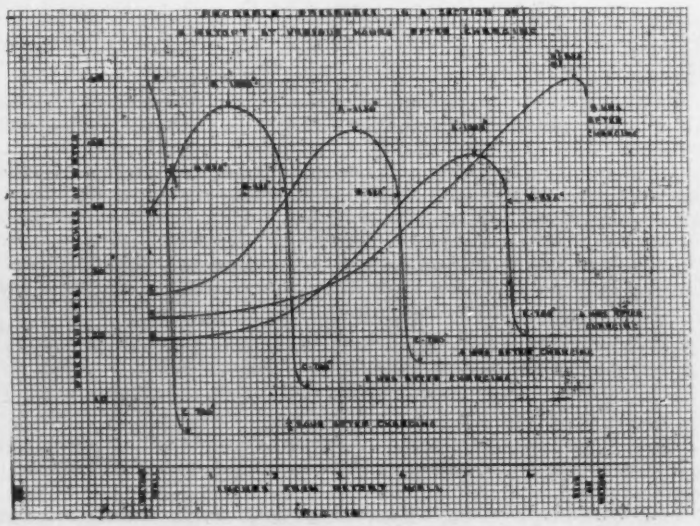
The resistance *B*, *C*, through the plastic layer, is probably constant for a given rate of flow, since there is no reason to believe that with a given size of coal the plastic envelope varies either in thickness or in resistance. As shown above, the actual quantity of gas passing through the plastic envelope decreases with the progress of carbonization; therefore, the actual drop in pressure through the envelope will decrease.

The area of the core diminishes with the progress of carbonization, while the quantity of gas flowing also decreases, so that, as shown by curve 3 in Fig. 4, the net result produced is a greater drop in pressure.

Probably the decrease in the pressure drop through *B*, *C* (due to the slower rate of flow) is about equal to the increasd through *C*, *D*, and the total drop *B*, *C*, *D*, remains nearly constant. Any variation in the total pressure difference between *A* and *D* must then be due to a variation between *A* and *B*.

From this it follows that the fall in pressure between *A* and *B*, and hence the actual distance *A*, *B*, is a maximum at the beginning of a charge and decreases with the time after charging. We, therefore, have a zone of high pressure points, *A*, lying between the plastic envelope *B*, *C*, and the retort wall, *F*. While they are both moving towards the core, this zone travels more rapidly than the plastic envelope. The temperature of the pressure zone decreases as it approaches the plastic envelope, or decreases with the time of carbonization. The gas distilled from that portion of the charge lying between *A* and *C* flows through the core; that distilled from the portion between *A* and the retort wall *F*, escapes by way of the path *A*, *E*, next to the retort wall.

Fig. 14 is a vertical, half-section of a portion of the charge, and indicates what may occur with a coal of varying size in which the resistance is high.



About half hour after the beginning of the charge the pressure zone *A* is at the wall, and practically all of the gas breaks through the plastic envelope into the core. The quantity of gas made is a maximum, so that the actual resistance to flow through the incompletely carbonized coal *A*, *B*, and the plastic envelope *B*, *C* (see also Fig. 13) would be high.

At the end of 2 hours the pressure zone *A* might be 1¼ inches from the retort wall, and the plastic envelope *B*, *C*, 2¼ inches away, the temperature of *A* being 1,300°. All the gas distilled below 1,300° would pass into the core, all distilled above 1,300° escaping along the retort walls. After 4 hours the temperature of the high pressure point would be, say 1,150°, and its distance from the retort wall about 3¼ inches. The distance between *A* and the plastic envelope would have decreased from 1 inch at the end of 2 hours to ¼-inch after 4 hours.

From Fig. 14 we should say that 2 hours after charging, all of the gas distilled below 1,300°, or 54 per cent. of the gas made at that time, flows through the core. At the end of 4 hours all distilled below 1,150°, or 40 per cent., leaves by this path. For the first 6 hours after charging, when 70 per cent. of the total gas is given off, about 45 per cent. travels through the core and 55 per cent. through the hot coke next to the retort walls. In general the maximum pressure decreases as the pressure point *A* moves towards the core. Then the plastic envelope disappears and the pressure decreases rapidly, the gas flow being distributed more or less uniformly throughout the charge.

In the retort upon which these experiments were made the maximum pressure occurs shortly before the plastic envelope reaches the core. This is undoubtedly due to the top carbonizing ahead of the bottom, which obstructs the flow of gas through the upper portion of the core and forces it out through the coke, thereby increasing the pressure.

The above figures will vary greatly with the character of the coal and the position in the charge. Coal of high resistance (either dust or of varying size) will increase the resistance to flow through the core and consequently decrease the quantity of gas flowing. This gas will also be of a lower temperature product than when using coal of low resistance.

The resistance to flow along the walls, compared with the resistance through the core, will be greater at the bottom than at the top

of the charge. Consequently, a greater percentage of the gas generated at the bottom will flow through the core than of that generated at the top. In general, the proportion of gas traveling through the core will increase with the percentage of voids in the original coal and with the distance below the top of the charge, decreasing as carbonization advances. The gas evolved at low temperatures (which would be more liable to injury by excessive heat) escapes through the cool core, and that evolved at higher temperatures, which escapes along the walls, being composed chiefly of hydrogen and marsh gas, is, therefore, not readily injured by heat.

Exhibitors, Gas Show, Philadelphia, Pa., Dec. 2-6, 1913.

A-B-Stove Co.—The success of the ranges "made in Battle Creek" by this Company is rapidly becoming known. The display and arrangement are good and the selling points are well and pithily told by Messrs. Thos. J. Moran and J. A. Alexander.

Acme Refrigerating Co.—

American Gas Furnace Co.—A splendid display and well arranged, showing its hardening and annealing furnaces, heating machines, tempering furnaces, lead hardening furnace, burners and blow pipes, and positive pressure blowers. Messrs. P. F. Reichhelm, J. Mehrman and T. Farwick, in charge.

American Graetzin Light Co.—Showing low pressure house burners, indoor lamps, outdoor lamps, and high pressure outdoor lamps. In charge, Messrs. H. Graetz, S. Schoepke, C. Coleman and T. D. Finley.

American Meter Co.—This exhibit is always a splendid one. This year, in addition to its regular line of meters, it has various experimetal apparatus pertaining to the gas industry. Messrs. H. R. Cartwright and G. B. Finn will welcome all visitors.

Backus Heater Co.—Show a complete line of open fire place, steam heaters, also improved Backus heaters with tile fronts. Represented by Messrs. C. F. Clement and F. E. Backus.

Baltimore Gas Appliance and Mfg. Co.—The new Oriole, 3118 cabinet range with revolving broiler, also several types and sizes of other ranges and water heaters, shown by Messrs. H. W. Hunter, W. A. Richards, R. P. Crawford and J. R. Wheeler.

Bayley & Sons.—Manufacturers of the famous "Equalite" semi-indirect lighting appliance show a very interesting assortment of high grade fixtures, portables and "Equalite" discs. Striking examples of their product are the lighting equipment of the entrance hall and first floor of exhibition building. Represented by Messrs. R. W. Bayley and W.W. Barnes

Blodgett Co., G. S.—Portable gas bake ovens in operation, shown by Messrs. J. S. Patrick and J. J. Raine.

Brown Instrument Co.—Shows its interesting line of pyrometers and thermometers. Messrs. G. V. Nightingale and J. P. Goheen in charge.

Central Flat Iron Co.—Exhibiting its I. M. E. and Stewart gas irons—with Messrs. E. P. McKinney, T. C. Scott and C. C. Crum in charge.

Clark Co., Geo. M.—Show cabinet ranges, double oven ranges, restaurant ranges, single oven ranges and several water heaters. Messrs. R. K. Clark and I. W. Peffly, and a numerous staff.

Clow & Sons, J. B.—Show their line of "C" gas steam radiators and gas water heaters, represented by Messrs. J. H. Brown, W. F. Latimer and F. E. Hutchins.

Crandall-Pettee Co.—Portable baker's reel ovens, with Mr. Paul J. Delaney in charge of exhibit.

Crane Co., Wm. M.—The well-known "Vulcan" gas ranges, water heaters and other gas appliances, together with Bray burners, make a creditable display. Messrs. W. M. Crane, G. H. Warner, C. F. Timm, H. N. Christmas, H. L. Schutt and G. M. Howsmon, are in attendance.

Detroit Stove Works.—Assortment of Jewel ranges, including following types: Hotel gas range, hotel gas broiler, double oven ranges and cabinet. Shown by Messrs. G. W. Johnston and H. D. Schall, assisted by a competent staff.

Eclipse Gas Stove Co.—The extensive line of this Company's product includes besides the gas stoves, hot blast hotel ranges, restaurant ranges and heating stoves, all tastefully arranged. Messrs. G. D. Roper, M. J. Green, W. H. Gaffney, H. C. Aiken, J. M. Brock, J. M. Parker, in attendance.

Economy Iron Works.—

Eriez Stove and Mfg. Co.—Showing gas ranges, heaters, floor furnaces and gas appliances. Messrs. J. E. Mason and W. R. Epp, in charge.

Estate Stove Co.—All kinds of "Estate" gas appliances. Represented by Messrs. D. F. Kahn, B. B. Kahn, D. C. Harr, J. D. Taylor, E. F. Davis, J. A. Ladley and Chas. E. Draper.

General Gas Appliance Co.—The Triplex gas ranges and cookers, and the Simplex water heaters with types of bake ovens and gas fired boilers, shown by Messrs. C. B. Elmer, J. A. Sackett, H. A. Shunk and staff.

General Gas Light Co.—"The Humphrey Arc makes Light of the Dark." The real exhibit of Humphrey lamps is not at the booth in exhibition hall, but note the outdoor lamps stretched across the front of the Academy of Music and in the balconies, and the display of indoor lamps, lighting the entire second floor of exhibition. Those in attendance will be Messrs. A. H. Humphrey, W. F. Weadley, J. P. Conroy, G. T. Fisher, C. E. Blood, J. M. Coles and staff.

Gilbert and Barker Mfg. Co.—Show following gas furnaces: Forge, semi-muffle and muffle, rectangular pot, round pot crucible, end-heating, soldering and rivet heating, shown by Messrs. W. F. Scully and M. K. Epstein.

Griffin & Co., John J.—The goods exhibited by this well-known house include capacity testing apparatus, calibration testing apparatus, prepayment mechanism meters. Represented by Messrs. W. G. Gribbel, Chas. Atherton and S. E. Simmonds.

Hays Manufacturing Co.—Hays service and meter cocks, curb boxes, tapping and drilling machines. Exhibit in charge of Messrs. C. E. Mueller and R. C. French.

Helme & McIlhenny.—Show their regular meters of various sizes including the "A" and high-speed type, prepayment meters 3 to 60 light for either quarters or nickels, also the Foulis gas governor. Well arranged and in charge of Mr. Wm. L. Brown.

Humphrey Co.—This year's exhibit of the Company's fine line of heaters, includes a new shower geyser. The Company's slogan is "Built for lasting service." Exhibit in charge of Messrs. H. S. Humphrey, T. A. Lemke, H. P. Dains and staff.

Improved Appliance Co.—Show quite a variety of industrial appliances, such as confectioners' furnaces, candy batch warmers, cauldron furnaces, soft metal furnaces, brazing burners and table, steam generator, lacquering and japanning oven and soldering furnaces. Mr. S. Tully Wilson in charge.

Kane Manufacturing Co.—Water heaters and gas steam boilers.

Kirchberger & Co, Inc., M.—Exhibit a large assortment of gas tips, stove and reflector tips. Represented by Messrs. M. Kirchberger and F. W. Oettinger.

Koenig, H. A.—Showing his gas irons.

Lindsay Light Co.—Exhibiting its line of incandescent mantles, lights and Lindsay guaranteed mantles. Those in attendance are Messrs. C. R. Lindsay, Jr., G. P. Gilman, Alex. Sinai, and staff.

Lloyd Construction Co.—Vacuum governors, street pressure control and several specialties, including valves. Mr. W. S. Guitteau in charge.

Long-Landreth Co.—Climax circulating water heaters and Kompak automatic heater, also steam house heater. Shown by Messrs. J. V. Landreth, H. J. Long and F. D. Schneider.

Manufacturers' Sales Co.—Its well-known meter connections and gas specialties are exhibited by Messrs. M. A. Corbett and F. E. Stevens.

Meek Oven Co.—These bakers' ovens shown in operation by Messrs. A. G. Vogel and F. W. Piper.

Michigan Stove Co.—Garland ranges for domestic and hotel use, shown by Messrs. L. B. Young, J. V. Peck and J. R. Strain.

Mueller Mfg. Co., H.—As usual, a splendid display of gas brass goods, service boxes, tools, reducing and regulating valves and strainers, with Messrs. Robt. Mueller and W. F. McCarthy in charge.

National Incinerator Co.—Exhibit garbage burners of the one bushel device, and two bushel device, in charge of Mr. H. V. Collins.

National Stove Co.—This Company's well-known "Direct Action" ranges are being shown by Messrs. S. E. Little, Thos. Rath and E. E. Gilbert.

National Tube Co.—"Kewanee" specialties—joints, pipes, valves, fittings, etc., attractively arranged. Messrs. L. F. Hamilton, W. S. Bitting and staff.

New Process Stove Co.—Shows its line of gas ranges, heating stoves and water heaters, represented by Messrs. J. G. Way, M. A. Parsons, W. G. Vaught and W. G. Withers.

Nightingale Co.—Is exhibiting Ricketts' incinerators in ¾ and ½ barrel sizes, wall and portable type. Messrs. J. B. Ricketts and C. G. Wright in charge.

Phaeton Heater Co.—Exhibiting its gas water heaters. Dr. A. H. Elliott, of New York, and Mr. F. Horton in charge.

Philadelphia Stove Co.—Exhibits Clover Triumph gas water heaters, rust proof, represented by Gas Appliance Sales Co.

Pittsburgh Water Heater Co.—The celebrated Lion heaters in a large variety of types and sizes, also showing the new No. 50 "Pittsburgh" storage system. Those in charge are Messrs. R. C. Frampton, T. J. Smith, Jr, Fred. K. Wells and a large staff.

Rathbone, Sard & Co.—The "Acorn" exhibit include surface combustion ranges, and some short cabinets. Messrs. G. E. Millspaugh, G. E. Harris, *et al.*, in charge.

Rector Gas Lamp Co.—Shows its gas radiator which should be seen and studied by all gas men. Do not go away without seeing it. Messrs. A. Rector, F. A. Mosher and E. G. Robinson in attendance.

Reliable Stove Co.—The representatives showing Reliable gas ranges are, Messrs. H. C. Fritz, E. C. Fritz, Robt. Wilson and staff.

Reznor Mfg. Co.—An extensive line of the well-known Reznor type of heaters, shown by Messrs. J. W. Ayer and Chas. Harbison.

Ringen Stove Co.—"Quick Meal" ranges, heaters and water heaters, shown by Messrs. R. L. Kahle, W. A. Lockwood and C. S. Smith.

Roberts & Mander Stove Co.—"Quality" gas ranges. Exhibit in charge of Messrs. Stanley Grady and J. W. Guise.

Rosenbaum Mfg. Co.—"Uneedit" and "Rose" gas irons, shown by Mr. Samuel Rosenbaum.

Rulu Gas Lighter Co.—Showing automatic gas range lighters. Represented by Messrs. J. K. Luethe and F. K. Johnson.

Ruud Mfg. Co.—Water heaters.

Shapiro & Aronson.—Gas chandeliers and brackets, upright and inverted, semi-indirect gas fixtures. Messrs. N. W. Belmuth and Charles Praitsching in attendance.

Sheppard & Co., Isaac A.—

Somerville Mfg. Co.—The Stack water heaters are displayed. Messrs. E. S. Stack, A. L. Rand and W. L. Hallett in charge of exhibit.

Sprague Meter Co.—Shows a full line of cast iron gas meters and house generators. Represented by Messrs. H. H. Greenfield, W. P. Hutchinson and staff.

Storrs Mica Co.—Exhibit samples of mica chimneys, cylinders and canopies. Messrs. A. P. Storrs and C. P. Storrs in charge.

Strause Gas Iron Co.—The "Iwantu" iron shown by Messrs. L. J. Strause, Max Heller and Harry Strause.

Thomas, Roberts, Stevenson Co.—"Fortune" ranges, shown by Messrs. F. C. Greene, C. E. Richardson, R. H. Thomas and Mrs. A. A. Carroll.

Trenkamp Stove & Mfg. Co.—

Union Stove Works.—"Astor Cabinet" range and "Cute Cooker," shown by Messrs. G. C. Pennell, A. F. Glaessner, E. G. Seewald.

Welsbach Co.—This Company's lamps are used for the illumination of the first floor and entrance lobbies of the exhibition hall, and includes all the latest productions. The booth carries these and other novelties where they can be more closely examined. Every year they have something brand new to show the gas fraternity.

Weir Stove Co.—Glenwood ranges shown by Messrs. R. M. Leach, M. E. Abbott, G. A. McKinney.

Westmacott Gas Furnace Co.—Oven furnaces, brazing table, melting furnace, muffle furnace, shop forge and numerous smaller appliances, blowpipes, etc., shown by Mr. W. C. Buell, Jr.

Wilson Mfg. Co.—

Wood Mfg. Co., John.—Electric weld water heaters shown by the Gas Appliance Sales Company, of America, and aided by Mr. H. E. Gilbert.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, November 10, 1913.

After the Exhibition.—A Discussion on Free Cookers.

The National Gas Exhibition with Congress is now a thing of the past. The well arranged and tastefully decorated halls exist only in memory, except so far as they have been perpetuated by the art of the photographer. And gas engineers and other officials whose time has been largely encroached upon during October, by repeated journeys to London, are now busily engaged in overtaking arrears and seeing to matters that were postponed until after the exhibition. The last three words, by-the-way, have become quite a stock phrase, and commercial travellers complain of the general effect on business. If by chance they happened to find the manager in his office, he was too busy to attend to business from the seller's point of view. With regard to those who have taken a prominent part in the Exhibition and the numerous functions included, one can hope they have reliable assistants or understudies to keep things straight at home.

There is a general, indeed a unanimous opinion, that the Exhibition has proved an entire success in realizing the ends in view where it was promoted, and which I have already described, though it is too early to judge of the actual effect on the industry as a whole. There is no question but that it will be marked and decisive. The London companies and those within easy distance, say under 1 hours' journey, will immediately experience the benefits, but later these may be expected to be evident all over the country. The population of London, including the suburbs, represents not less than one-sixth of the total, and everybody, even in the remote corners, has relations or connections in London, so that anything done or happening in the metropolis is soon known throughout the length and breadth of the land, if not in the colonies and abroad. Like the Salvation Army, the Exhibition has been the means of getting at tough customers who are inaccessible to ordinary methods. A man who does not read advertisements, destroys all circulars and pamphlets, and shows the canvasser the nearest way into the street, perhaps with threats of personal assistance on the journey, will go and have a steady thoughtful look round at an Exhibition where there are no salesmen, and he usually has sense enough to know a good thing when he sees it. The public have attended in their thousands, and while the Exhibition did not claim or pretend to instruct the professional man, the most skilled and advanced men in the profession could not by any chance fail to get many valuable ideas. It is this class, by the way, that are the most willing to learn. The man who thinks he has attained finality is usually laboring under a delusion.

The various arrangements for congresses and meetings as indicated last month, were all carried through successfully, and it is very satisfactory to be able to add, without any important accident or casuality. For such an extensive undertaking, this is a matter for surprise, and it reflects credit on the careful manner with which all arrangements were laid out. The public are always ready to complain of any neglect in connection with the public service of the country, but they do not appreciate the continual care, system and ability that have rendered accidents so rare. It is scarcely possible to give any idea of the matters submitted and discussed at the various meetings, but there was one event that calls for extended notice, and that was the luncheon given by the four London gas companies to the members of the British Commercial Gas Association, at which 500 guests attended. It comprised probably the most influential representation of gas interests that have ever been gathered in one hall, especially of that class that have not hitherto been so prominent in connection with the progress of our industry as they should and ought to be. I refer to directors, committee men and large shareholders.

Sir Corbet Woodall, as the Governor of the Gas Light and Coke Co., occupied the chair, and in proposing success to the British Commercial Gas Association, claimed to be submitting a wide and comprehensive subject. The Association included not only those interested in the manufacture, distribution and sale of gas, or of gas fittings, constructing contractors and makers of appliances of all kinds, but also the consumers of gas. The Association in a sense worked for and cared for the interests of the gas consuming public, and he need only refer to the National Gas Exhibition as an example of the close and intimate relationship that exists between the Association and the user of gas. He emphasized the fact that the Association was not for London and the surroundings alone, but for the whole of the country, and that all localities and all sizes of works were represented on the committee and receive equal consideration. The Association was young, only two years old, but its supporters were rapidly increasing, and many who shook their heads and prophesied failure at first were now on the members list. Mr. Edward Allen, President of the Association, in replying, said they were very young, but also very strong. He admitted they had very great responsibilities both to the public and the profession, but at the same time would venture to submit that they had proved themselves competent to render adequate service in the cause of education and publicity. Alderman F. S. Phillips, Chairman of the Salford Corporation Gas Committee, proposed success to the London gas companies, and took the opportunity to allude to the many ways in which the London gas companies had placed the benefit of their large and extensive experience at the service of the Association. He believed that London was entitled to the credit of its initiation. He was strongly impressed with the fact that notwithstanding competition and some disadvantages, the industry was not going backwards, but, on the contrary, was steadily and surely advancing. It had done very great things for the benefit of the community at large in the past, and would do more in the future. Mr. Chas. Carpenter, Chairman of the South Metropolitan Gas Co., thought that the response to the toast should rightly have fallen to their chairman of the day, as the head of the largest London gas company. He instanced some of the conditions peculiar to the metropolis as regarded gas supply, and remarked that in every case special methods were required. Alluding to the Anglo-American Exhibition to be held at the White City, Shepherd's Bush, in 1914, he made a spirited appeal to those present to see that gas was adequately represented at that exhibition, and referred to the difficulties that his company had experienced in connection with getting a stand at another exhibition held in London this year, as illustrating the fact that determined endeavors were being made by interested parties to push gas into a subordinate position. Mr. H. E. Jones followed on behalf of the Commercial Gas Company, and enlarged on the need for following up publicity with cheap gas and a good service. His company had a purely industrial district, and their customers were confined to the working classes. They had no high class suburbs and no room for expansion. But under these disadvantages they had proved that it was possible to develop and maintain large sales of gas per head of the population. The remaining toasts were of a personal character.

A short time ago I had something to say about "free" gas appliances, and am, therefore, interested to observe that, at a recent meeting of the Scottish Junior Gas Association, the subject was introduced for discussion by Mr. James B. Stewart, in the course of a paper on the "Commercial and Distributing Side of the Gas Undertaking." Mr. Stewart argued that no one was better able to furnish, equip and maintain gas appliances in perfect going order than a well organized gas undertaking, and that it was the duty of every undertaking not only to see that the consumer was furnished with the best possible appliance for his purpose, but also that it was maintained and used in the best and most economical manner. But the policy with regard to this branch of work should be based on sound business principles, and as there could not be any legitimate charge for appliances and maintenance against manufacture or distribution of gas, it should stand by itself and pay for itself. If it did not do so, then the selling price of gas must include the cost of the "free" supply or service, and he said that was a bad business principle, and asked if those who had adopted it were prepared to follow out the logical conclusion and supply appliances for lighting, heating, cooking, motive power and whatever the consumer wanted, and to charge the same as one of the expenses incidental to the manufacturing distribution of gas. The tendency in doing so would be to increase the price of gas, and the small consumer, who was the backbone of any gas undertaking, would soon appreciate the fact that he was called upon to help the upkeep of large and expensive appliances, and would revert to coal for heating and cooking. Thus a present increase might in time be lost and neutralizsd. He favored simple hire, inclusive of maintenance charges, or hire purchase with a fixed annual charge for main-

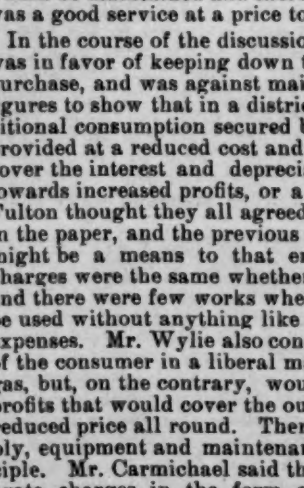
tenance. With a well organized and efficient staff, the charges could be kept low, and with a cheap or moderate price of gas, the revenue would be maintained and increased. The best advertisement for gas was a good service at a price to suit all consumers.

In the course of the discussion on the paper Mr. McCowat said he was in favor of keeping down the price of gas, and preferred hire-purchase, and was against maintenance in any form. But he quoted figures to show that in a district at present using no cookers, the additional consumption secured by fixing a large number free could be provided at a reduced cost and leave a margin that would not only cover the interest and depreciation on outlay but also something towards increased profits, or a reduction in the price of gas. Mr. Fulton thought they all agreed in the general conclusions expressed in the paper, and the previous speaker had shown that the free cooker might be a means to that end. The standing and establishment charges were the same whether they made 17 or 70 millions a year, and there were few works where a large increase in make would not be used without anything like a corresponding increase in working expenses. Mr. Wylie also concluded that strict attention to the wants of the consumer in a liberal manner, need not increase the price of gas, but, on the contrary, would lead to greater consumption, and profits that would cover the outlay, of not only that, but admit of a reduced price all round. Therefore, he could not agree that the supply, equipment and maintenances of appliances free was a bad principle. Mr. Carmichael said that many people objected to extra separate charges in the form of quarterly rentals, and that where increased business could be secured, at a reasonable outlay, the free system was sound and good. Mr. M'Ghee said that in Glasgow, previous to the abolition of rents for cookers about two years ago, the revenue from cookers was £10,000, less than one halfpenny per 1,000 cubic feet of gas sold. But in that two years the number of cookers had increased more than in the previous 20, and the day consumption had gone up. The same might apply to gas fires, but he thought there should be a minimum consumption or some rule to insure the appliance being regularly used. Mr. A. Wilson said that in Glasgow they had 170,000 cookers in use. Mr. Stewart's argument about each item of the expense standing on its own footing, and paying its own share, might be applied in other ways. Large users for summer or day consumption could claim the benefit of the lower cost of production as applied to such additional output. And the application of this policy would lead to lower prices all round, which was what they were aiming at. Mr. Stewart, in replying, said he had never met with any figures showing that free cookers led to a reduced price of gas, and it did not matter what the size or the circumstances might be, when questions of sound thorough business were concerned. Mr. M'Cowals figures showed a charge of 3d per 1,000 cubic feet of gas to cover the depreciation and interest on outlay, and he suggested that it would be better to reduce the price of gas to that extent.

The various arguments for and against were competently and courteously expressed, and the discussion, on the whole, is an admirable example of the advantages afforded by these Association meetings. It is an interesting presentment of an important question.

New Methods and Appliances.

BURNER FOR FULLY AERATED MIXTURE.—An English patent has recently been issued for this burner designed to give a large number of well aerated flames, each burning in a separate cell in a disc or plate of refractory material. The refractory disc is preferably of fire clay or asbestos composition, and the walls of the cells become heated and give off considerable radiant heat. The burner can be made of any shape or size, one of 2½ inches square having the plate, *A*, approximately ¼ inch thick, giving about 100 individual flames. The plate is mounted in a casing, *C*, a space, B, being formed between the base of the casing and the plate, and this chamber is connected to a mixing tube with gas and air inlets. The casing may have an extension by which several burners might be fitted to one or more mixing or Bunsen tubes. There is, however, practically no limit to the size of the burner, and larger or smaller plates may be made for special purposes. One side of the plate, *A*, is perforated with passages or channels, *P*, which may be any shape in section, but must be of such area and length as to prevent back firing of the combustible mixture, even when the burner is radiating against an object. Each of these passages leads to an open cell, P^1, having a greater cross sectional area than its passage, *P*, the cells forming the outer face of the disc.



A series of burners may be assembled to make a burner suitable for any purpose, such as a gas fire; the burner can be used in any position, and once the gas supply is adjusted no further attention is necessary.

In some cases a perforated metal plate, P^3, shown by dotted lines, may be arranged so that its perforations correspond with the passages, *P*, in which case the length of such passages may be reduced.

A muffle 8½ inches by 5 inches by 3½ inches, having walls ¼ inch thick, has been heated up to 865° C. in 30 minutes, and after 1 hour reached 942° C., the consumption of gas, with a pressure of 2-inch water, being 30 feet per hour.

As before stated, the walls of the cells become red hot, thus giving a glowing effect, which may be increased by corrugating the walls of the cell, as shown at P^4.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. LEROY J. HANNAH has resigned the position of Superintendent, new business division, the Louisville (Ky.) Gas and Electric Company, to take up a responsible position in connection with a large distilling combination. Mr. Hannah was formerly in charge of the new business section of the Kentucky Electric Company, and when that concern was absorbed in the existing united enterprise of the Louisville Gas and Electric Company, he was appointed to the place now relinquished by him.

WE regret to announce the death of Mr. Thomas E. Mone, for some years connected with the office force of the Williamsburgh Branch, Brooklyn Union Gas Company, at his home, 332 Berry street, the morning of November 20th. He is survived by his wife, three sons and eight daughters.

WE understand that Mr. P. H. Bailey, heretofore connected with the industrial division of the Fremont (O.) Gas Company, has been appointed to the position of "Industrial Engineer," the Louisville (Ky.) Gas and Electric Company.

THE Keokuk (Ia.) Electric Company, which also controls the gas supply of that city, has completed a good season's work on the gas distributing mains of its system. The latter was increased about 5 miles, and all the "1½-inch mains" have been replaced by pipes of diameter suitable to the work they are likely to be called upon to perform. No pipe under 4 inches was put down in the substitutings, and in fact some of the 1½-inch stuff was replaced by 6-inch bore tubes!

MR. E. J. PHILIP, the wideawake manager of the Water and Light Department, Municipality of Brockville, Ont., has completed the planning and placing of that which is, to all intent and purpose, a new generating house of the coal gas type.

GENERAL MANAGER H. C. MORRIS, of the Dallas (Tex.) Gas Company, has ordered that, commencing to-day, the supply of natural gas to the furnaces of boilers will cease. He believes that this order will not be rescinded until March 31, 1914.

MANAGER SEARS, of the Fort Worth (Tex.) Gas Company, has also notified the users of natural gas on fuel account in the city's large industrial establishments, that such supply will be discontinued to-day.

WE are told that a stock company (Mr. J. R. Lovely, President, Business Men's Association; J. F. Aveness, J. W. Lovely and W. S. Ricketts), has taken over the work of constructing a gas plant in Fowler, Cal., the franchise for which was held by a party named Webber—he continues in the project. Much material for the construction has been on the ground for some time, its disuse being traceable to the fact that the capital promised to Mr. Webber was not forthcoming. The work of building will now go on forthwith.

"L. M. M.," writing from Darby, Pa., under date of the 22d November, says: "No doubt you will consider this a trifle late in the day, to call attention to the fact of the good time we recently enjoyed on the occasion of the 'Fall Meeting,' employees of the Darby branch, Suburban Gas Company, Chester, Pa. However, here is the story. Not long ago 35 of the men on the work rolls of the Darby branch (together with a few invited guests) assembled in the new garage of the Company, back of the Pine street works of the Company, to share in a sauerkraut supper, that certainly was of the 'krautest' sort. Indeed, when it is said that it was cooked and served by the only 'Jake' Lentz, all is said that could have been said. When the 'kraut was loss,' Mr. Chas. J. Fox, Superintendent of the Darby district, seated in the toastmaster's box, assumed charge. One of the numbers was an interesting recital of reminiscences by George

Savage, of the Chester district, who is well into his second score of years with the Company and its predecessors; in fact, when four-footed reynards could be hunted out of their lairs most any frosty morn. 'Ed.' Burke told them how things were done in the old plant of the Media Company, and Brother Milloway made a fairly long discourse on how gas was made in Swarthmore College in the days of old. In fact, Milloway got quite mellow when the thoughts of 'the Swarthmore girls of old,' not 'old girls,' mind you, found expression in his speech. 'Jake' Kitts, the 'sweet singer' of the party, tried a tune, but he absolutely 'frisked' when called upon to sing the 'Darby Ram.' Poor, old 'Jake!' Mr. Fox assisted in the scale by a proroguing of the party as to the intertwining of the interests of the Company and its men; and he spoke with much earnestness and sincerity. Take it all-in-all, the meeting was a right good one. I might add that a feature of the feast was the fine appetite that was in evidence by and through the only 'Cy.' Greenwood."

F. R. Mason, writing from Denver, Col., under date of the 19th ult., says that the Rocky Mountain Gas Company means active and positive work on the construction of the gas plant at La Junta, Col. The promise is that the plant will be in active operation on or before June first, next. This will be speedy work, considering the location of the place. La Junta is the capital of Otero County, Col., and is on the Arkansas river, at a point 64 miles east-southeast of Pueblo. It is right on the line of the Atchison, Topeka and Sante Fe R.R., which corporation maintains extensive shops there. It is a noted grain shipping point, and has several good elevators. Its growth is quite rapid. For instance, in 1900 its population numbered 2,300; ten years later it was 5,200; at present it is not far from 7,000.

Here is a press dispatch which is well worth repeating: "*Urbana, Ills.*, Nov. 17th.—Showered with plaudits of the officials and students of the University of Illinois for the bravery he displayed, when he risked his life to save the Womans' Building of the University, John Brannigan, of Champaign, Ills., left his bed to-day to return to work for the Champaign Gas Company. Brannigan discovered a leak in a gas pipe in the household science laboratory, and investigated. When he opened the door of a gas filled room he was blown across the hall by an explosion; but he fought his way back to the room and shut off the gas escaping from an open gas tap."

On the evening of November 18th, Mr. Walton Clark, President the Franklin Institute, Philadelphia, presented the John Scott Legacy Medal to Mr. Malcolm Ellis (Newark, N. J.), inventor of the Ellis adding typewriter machine. The Scott Medal is awarded by the city of Philadelphia, on the recommendation of the Franklin Institute "To men and women who make useful inventions."

"W. B. S.," writing from Birmingham, Ala., under recent date, sends this: "Mr. K. L. Simons, who goes from Birmingham to assume the dual office of Vice-President and General Manager, the El Paso (Tex.) Gas Company, was the recipient of these gifts: A silver service from the men in the office of the B. R. L. and P. Company; a gold watch from the men in the gas works division of the corporation; a gold knife from Superintendent Montgomery, of the street department; and a valuable gold headed walking stick from the gas fitters."

The Chippewa Valley Railway, Light and Power Company, of Eau Claire, Wis., has acquired control of the Eau Claire Gas Light Company, through purchase of the shares (these amounted to control) in it that were held by the executors of the estate of the late Mr. David Douglas.

"C. H. W." incloses this from Yonkers, N. Y., under date of November 21st: "Elks' Hall, Mount Vernon, was crowded with employees of the Westchester Lighting Company, and their families, last Friday evening, the occasion being the first lecture and entertainment of the series arranged for the winter months to instruct and amuse the force. The lecturer on the 21st was Mr. William L. Bruce, the wideawake Claim Agent of the Clark battalions, whose clever presentation of the subject of "Accident Prevention' was tellingly illustrated in the prologue by means of stereopticon views. The succeeding chapter, which had to do with 'rescue work,' was made vividly realistic by a demonstration (in which the leading spirits were the members of the New Rochelle Life Saving Crew' of the pulmotor in the resuscitation of persons suffering asphyxiation either from water or gas. Of course, Mr. Bruce was prominent in this illustration. After the serious work had been concluded a minstrel show, which was really of high class, satisfactorily closed the session."

The Brown Hoisting Machinery Company, of Cleveland, O., has completed, on the Schenectady (N. Y.) plant of the Mohawk Gas Company, an electric travelling crane, for the speedy, convenient and safe handling of coal, and other heavy and bulky materials in and about the yard. It has a capacity of one ton at the end of the boom (50 feet) and takes its power from a third rail.

Mr. C. R. Stull, since 1911, Manager of the Bangor (Me.) Gas Light Company, which is operated by the American Gas Company, has been transferred to the position of Resident-Manager of the Waukesha (Wis.) American Gas Company, the change to become operative to-day. Mr. O. A. Merchant, of the Coatesville (Pa.) Company, succeeds Mr. Stull at Bangor.

Mr. Henry M. Wallace and associates have purchased the west half of block 41 (bounded by Power, Palo Alto, Galvan and Oro streets) as a site for the new gas plant for Corpus Christi, Tex. The main system is on the generous scale of 18 miles, which means that every stretch of the business and residential part of this rapidly growing place will be hooked up to the works. We understand that all the important contracts on plant construction account have been let. The generating system is to be of the water gas type, and the holder provision is for the retaining of 100,000 cubic feet. Mr. Brown, of Temple, Tex., will likely have active supervision of the construction work, and our informant failed to mention the names of the successful contractors.

Mr. F. W. Wenban has resigned the position of Superintendent of the Elmira (N. Y.) plant to take up the duties of Manager and Superintendent of the Owego (N. Y.) plant. Mr. Seeley succeeds Mr. Wenban.

At a meeting of the Council Committee on Utilities, Richmond, Va., the sub-Committee to whom had been entrusted the duty of investigating the conditions surrounding the gas supply of the city, reported a recommendation that the selling rate be fixed at 80 cents per 1,000 cubic feet. The prevailing price is 90 cents.

At 10 A.M., the 8th inst., the Public Service Commission, First New York District, will give a public hearing in Rockville Center, Long Island, over the right of the Nassau and Suffolk Lighting Company to charge $1.50 per 1,000 cubic feet.

Manager John J. Kirkpatrick, of the Gas and Electric Department, municipality of Holyoke, Mass., has arranged for the placing of a 36-inch ammonia distilling apparatus in the plant. The specifications under which bids were invited (these were opened last Friday) included the still proper, "A weak liquor tank, heater and pump, lime lye and pressure tank, air compressor, condenser and absorber, all geared and ready for operation."

At the last regular meeting of the Wilmington (Del.) Gas Educational Club, the main topic of the session was contributed by Mr. R. A. Walls, of the "System Magazine," of Chicago. His presentation had to do with the "Increase of the Efficiency of Service by the Elimination of Lost Motion; and, despite the decided mystification enveloping the title, his of-the-earth hearers proceeded, in the ensuing debate, to bring the application down to a purely practical basis. The officers elected at the last meeting to direct the Club's affairs the ensuing year were installed.—L.

Mr. W. F. Doelker, whose record at Mattoon, Ills., proves him an indefatigable successful worker, has been appointed Manager of the Concordia (Kas.) Gas Company. He is also in charge of the construction work now going on in connection with this enterprise.

There is no doubt now that Greenwich, Conn., is to have a gas works, which operation should have been going on in that beautiful settlement at least 20 years ago. The territory served by the Greenwich Citizens Gas Company covers about 6 miles, from Port Chester, New York, west line, to Stamford, Conn., on the east line and Long Island Sound. The population of the territory is not less than 25,000, and within the limits named are some of the finest semi-suburban homes in America. The main reason for this long delay in putting a gas plant in Greenwich was in the fact that the electric lighting people were strong enough to throttle such proposition, although the electrical suppliers really had the right to construct and operate a gas plant. The prospective concern is capitalized in $250,000, cumulative, 7 per cent. preferred, and $250,000 common. The preferred is to earn interest from May 1, 1914, and subscriptions to it will bear interest at 6 per cent. per annum, from time the cash is paid in, until the works are in operation. It is further provided that the preferred (which shares equally with the common in respect of voting power) may be redeemed at any time, on call, at $120 per share. This concern should be a go from the start.

The Market FOR GAS SECURITIES.

There is no change in the nominal market valve of Consolidated, sales having been within narrow bounds. The quotation this morning (Friday) is 126¾ to 127, which looks that, remembering the conditions to which the market (if market there be) is subjected, Consolidated is in for a fair increase in values. Take it all in-all, these shares have been less affected by existing influences than any other industrial traded in on the Exchange. The decline from the top notch has been about 10 per cent., whereas the average declines in other industrial shares has easily been 20.

Brooklyn Union's affairs have quieted much, that is, the disquieted (led by W. Bourke Cockran) have lapsed into sullen quiet, although still remaining sore and naturally dissatisfied. However, let us hope that for the next twelvemonths their individual business ways will be as well managed as those of the B.U.G.

The Company's declarations for the quarter were made on this basis: Regular, of 1½, and an extra of 1, both payable the 2d prox. Transfer books will be closed the 17th inst., and reopened the morning of January 2d.

The Brooklyn Borough (Coney Island) district) Gas Company's stock now stands at $1,000,000; virtually an increase of 100 per per cent. Reverting to the B.U.G., the excellent report presented respecting its operations shows that the ratio of manufacturing expense to gross receipt is 44.7, an increase over last year of 7.9 per cent., of which increase 6 per cent. is directly attributable to the higher charge on oil account. The total gross earnings are returned at 9 per cent. on the capital, as against 9.19 per cent. in 1912. Take it all-in-all, the Company's affairs are not only "conservatively" managed, but well managed. Its magnitude is shown in the fact that its output in the year amouuted to 13½ thousand millions cubic feet. It might also be said that the report foreshadows a return to coal carbonization, in that 18 per cent. of the cost of manufacture was charged to oil account in 1912, whereas the figure on like account in 1913 was 26.

The total net income of the Massachusetts Lighting Companies, for the 12 months ended June 30, showed an increase of $155,141, indicating a net profit of $80,474.39 over interest charges.

Preliminaries looking to the consolidation of the Washington and Georgetown (D.C.) Companies are in a formative stage, meanwhile quotations for Washington gas still keep at the top notch. The semi-annual dividend of $3 per share on the stock of the Blackstone Valley (R. I.) Gas and Electric Com pany is payable to-day.

The initial dividend of 1½ per cent. on the $10,000,000 outstanding preferred of the Louisville (Ky.) Gas and Electric Company was made payable the 15th inst., and the sum of $400,000 was set aside for betterments on its electrical division.

The Baltimore Consolidated Gas, Electric Light and Power Company has declared a regular quarterly of 1½ on the common, payable the 2d prox., and the business of the Corporation is expanding in most satisfactory ways. That the Gribbel-McIlhenny syndicate made no mistake in purchasing the Tampa (Fla.) gas property would seem borne out when it is said that the increase in output under their progressive management amounts to 20 per cent. or more.

The quotations for Peoples, of Chicago, are indicative of the changing over of quite a volume of investment stock, all of which, however, has been readily absorbed by the strong interests now in control.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

DECEMBER 1.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par alue of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	126¾	127
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	8,500,000	1,000	101	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	8,500,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	59	63
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	96	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	103	104
Preferred	5,000,000	100	93	94
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	90	95
The Brooklyn Union	15,000,000	1,000	121½	126
1st Con. 5's, due 1948, M. & N.	15,000,000	—	103¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Cincinnati Gas and Electric Co.	29,500,000	100	67	69
Columbus (O.) Gas Co., 1st				
Mortgage Bonds	1,500,000	1,000	96	98
Columbus Gas Light & Fuel				
Company	1,682,750	100	65¾	66¼
Preferred	3,028,500	100	33	35¾
Essex and Hudson Gas Co.	6,500,000	—	133	136
Laclede Gas Co., St. Louis.	10,000,000	100	95	98
Preferred	2,500,000	100	—	103¾
Bonds	10,000,000	1,000	103¾	104
Peoples Gas Lt. & Coke Co.,				
Chicago	35,000,000	100	117¼	119
1st Mortgage	20,100,000	1,000	103	103½
2d "	2,500,000	1,000	104	—
Pacific Gas and Electric Co.	15,500,000	—	35¼	35¾
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	96	8
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	113¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,976,000	100	50	55
Bonds	2,047,000	1,000	101	103
United Gas Imp. Co.	55,502,950	50	168	170
Washington (D. C.) Gas Co.	1,600,000	200	420	425
1st Mortgage, 6's	600,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	—	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, New York, October 21, 23, 1914. Officers: President, W. H. Gartley, Philadelphia. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting————1914. Officers: President, A. A. Dion, Ottawa; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct., 1914. Officers: President, J. T. Hutchings, Rochester, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Gas Meters.—Monthly Section Meetings; Grand Commissioner, Will. W. Barnes. East Orange, N. J.; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, W. H. Pettes; Secretary, G. E. Smith, Sipp Avenue, Jersey City, N. J. Philadelphia Section; Chairman, Stanley Grady; Secretary, H. E. Stitzler, Broad and Arch streets. Cleveland Section, Chairman, F. R. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, T. W. Jennings, Boston; Sec., F. K. Wells, 69 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman. Bethlehem Section, Trueman Weithnecht, Chairman; Sec.-Treas., Truman Buss, South Bethlehem, Pa.

Guild of Gas Managers of New England.—Annual meeting, March, 1914. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 18th and 19th, 1914. Chicago, Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting, Cleveland, O., September, 1914. Meetings of Sections, monthly. Pres., Charles O. Bond; General Secretary, J. D. Israel, 29 W. 39th street, New York City. Sections: New York, Secretary, C. L. Law, 124 West 42d street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, J. B. Jackson, 28 North Market street. Pittsburgh, Secretary, J. C. Mundo, Oliver Building.

Indiana Gas Association.—Annual meeting, March —— —— 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blinn, Evansville; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, Davenport, May 27, 28, 29, 1914; Officers: President, B. C. Adams, Lincoln, Neb.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October——1914. Arkansas City. Officers: President, Al. Newman, Arkansas City; Secretary and Treasurer, Ivan Thomas, Wichita Kas.

Michigan Gas Association—Annual meeting, September, 1914. Place, undetermined. Officers: President, H. W. Douglas, Ann Arbor, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1914; Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting and gas show, Dec. 1-6, 1913, Philadelphia, Pa. Officers: President, C. W. Hare, Philadelphia Pa.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, St. Louis, Mo., May 19 and 20, 1914; Officers: President, E. L. Brundrett, Kansas City, Mo.; Secy-Treas., T. Clive Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914, Boston. Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Next Meeting, ————, 1914, Asbury Park N.J. President, C. F. Butcher, Freehold, N. J.; Sec'y-Treasurer, O. F. Potter, Newark, N.J.

Ohio Gas Association.—Annual meeting, February ——— 1914 Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City May, ——1914. President, F. E. Bowman, Ada; Secretary-Treasurer, H. V. Bose Oklahoma City.

Pacific Coast Gas Association.—Annual meeting, Long Beach, Cal., September ——— 1914. Officers: President, C. S. Vance, Los Angeles, Cal.; Secretary-Treasurer, Henry Bostwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Allentown, Pa., April ———, 1914; Officers, President, J. A. Frick, Allentown, Pa.; Secretary-Treasurer. W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913; monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city.

Southern Gas Association.—Annual meeting, Mobile, Ala., April 4, 1914, Officers: President, James Ferrier, Rome, Ga.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May 22, 23, 24 and 25, 1914, Galveston, Tex. Officers: President, G. H. Gifford, Fort Worth Tex.; Secretary H. S. Cooper, 405 Slaughter Bldg., Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May ————1914, Milwaukee, Wis. Officers: President, Ewald Haase, Milwaukee, Wis.; Secretary-Treasurer, Henry Harman Milwaukee, Wis.